

# INTERNATIONAL FOOD INFORMATION SERVICE

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AB 49

EGGS & POULTRY MEAT

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Commonwealth Agricultural Bureaux, Farnham Royal, Slough; Gesellschaft fur Information und Dokumentation, Frankfurt am Main; Institute of Food Technologists, Chicago; Centrum voor Landbouwpublicaties en Landbouwdocumentatie (Pudoc), Wageningen.



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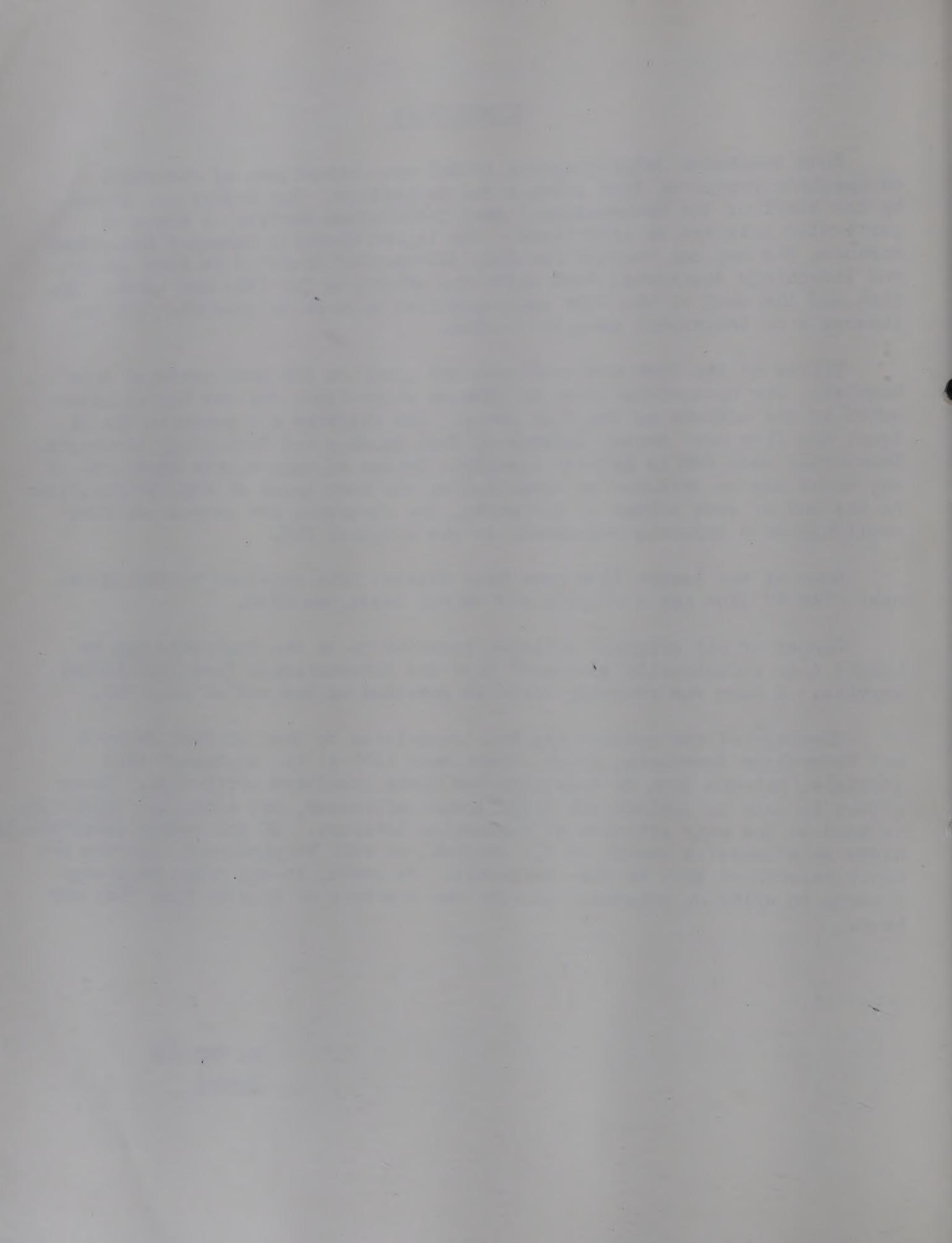
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H. BROOKES  
EDITOR



# EGGS (General)

## 1

[Hygiene of foods and feeds: problems of microbial resistance.] Probleme der mikrobiellen Resistenz im Bereich der Lebens- und Futtermittelhygiene.

Bulling, E.

*Bundesgesundheitsblatt* 23 (13) 195-198 (1980) [2 ref. De, en] [Robert von Osterag-Inst. des Bundesgesundheitsamtes, Postfach, 1000 Berlin 33]

Following a brief description of the mechanisms of resistance, development of resistance to antibiotics in bacterial pathogens is explained, taking salmonella as an example. Influence of so-called growth promotors on resistance phenomena is discussed. As examples from the field of food hygiene, problems of antibiotic residues in hen's eggs and gentamycin-resistant salmonella strains in turkeys are outlined. Uncritical use of antibiotics and chemotherapeutic agents may result in considerable problems related to resistance. AS

## 2

### Tetrachlorvinphos metabolism in laying hens.

Humayoun Akhtar, M.; Foster, T. S.

*Journal of Agricultural and Food Chemistry* 29 (4) 766-771 (1981) [15 ref. En] [Anim. Res. Cent., Agric. Canada, Ottawa, K1A 0C6, Canada]

Tetrachlorvinphos metabolism was studied, with the aid of a <sup>14</sup>C-labelled compound, in laying hens fed 50 p.p.m. of the insecticide. Approximately 71% of the radioactivity was eliminated in 24 h in excreta. After the final dose, an additional 1.3 and 2.6% of total <sup>14</sup>C was excreted during the next 3 and 7 days. Eggs laid within 24 h of the treatment contained radioactivity. <sup>14</sup>C was also detected in tissues and organs at an insecticide equivalent in the p.p.m. range in kidney, liver, and abdominal fat but in the parts/billion range elsewhere. After dosing was discontinued, the <sup>14</sup>C content of excreta, eggs, tissues, and organs gradually decreased. Compounds identified in excreta were desmethyl tetrachlorvinphos (25%), 2,4,5-trichloromandelic acid (30.5%), and tetrachlorvinphos (1.0%). During the treatment period, all tissues examined contained small amounts of the insecticide, but only traces were detected in tissues and organs from hens killed 7 days after the last dose. AS

## 3

### Reversed-phase high performance liquid chromatography of phosphatidylcholine: a simple method for determining relative hydrophobic interaction of various molecular species.

Smith, M.; Jungalwala, F. B.

*Journal of Lipid Research* 22 (4) 697-704 (1981) [23 ref. En] [Dep. of Biochem., Eunice Kennedy Shriver Cent. for Mental Retardation, Waltham, Maryland 02254, USA]

A convenient method is described for the separation of molecular sp. of phosphatidylcholine (PC), based on reverse phase HPLC. PC from egg and pork liver were resolved into 13 separate peaks, and detection was at 205 nm. The peaks are described in terms of % composition of various fatty acids, and results are tabulated. The mechanism of separation of the PC is discussed. Each molecular sp. was assigned a 'hydrophobic C number', based on the total number of C atoms and double bonds in the side chain. LH

## 4

### Dehydrochlorination of some organochlorine pesticides in freeze-dried egg and egg fat during storage.

Hill, A. R.; Smart, N. A.

*Journal of Agricultural and Food Chemistry* 29 (3) 675-677 (1981) [11 ref. En] [Min. of Agric. Fisheries & Food, Harpenden Lab., Hatching Green, Harpenden, Herts. AL5 2BD, UK]

In analysis of egg samples for pesticide residues, egg may be freeze-dried or extracted fat may be stored prior to analysis. It is shown that  $\alpha$ -HCH,  $\gamma$ -HCH and pp'-DDT degrade under such conditions, loss being due to dehydrochlorination. More stable organochlorine pesticides are not affected. Fat extraction technique affected dehydrochlorination behaviour in a manner that suggested that a heat-labile component of eggs promotes dehydrochlorination. It is concluded that, when eggs are analysed for organochlorine pesticide residues, the initial fat extract should be immediately cleaned-up for GLC detn., and not stored. Analyses of freeze-dried egg samples may not correspond with those of fresh eggs. DIH

## 5

### Binding of methylmercury to ovalbumin as methylmercuric cysteine.

Magat, W. J.; Sell, J. L.

*Journal of Agricultural and Food Chemistry* 29 (3) 543-547 (1981) [23 ref. En] [Dep. of Anim. Sci., Iowa State Univ., Ames, Iowa 50011, USA]

After administration of methylmercury in the form of  $\text{CH}_3^{203}\text{Hg Cl}$  to laying hens, the egg ovalbumin was isolated, and binding of <sup>203</sup>Hg was determined. Enzymic hydrolysis of ovalbumin, followed by covalent chromatography of the hydrolysate on 2-pyridyl-S-S-propyl-Sepharose, enabled the separation of a <sup>203</sup>Hg-labelled digestion product. Amino acid analysis of the latter, after acid hydrolysis and performic acid oxidation, produced only cysteic acid. The hydrolysed, but unoxidized, sample had an elution time different from that of cysteine or cystine. The <sup>203</sup>Hg-labelled, Sepharose-bound fraction showed a higher  $R_f$  value than either cysteine or cystine but a value less than that of methionine. It had a mobility similar to that of methylmercuric cysteine prepared in vitro. It was suggested that the fraction separated from egg ovalbumin contained methylmercuric cysteine and that the binding of the <sup>203</sup>Hg to the cysteine probably involved the SH group. AS

## 6

### Application of ultrasonic pulse-echo techniques to egg albumen quality testing: a preliminary report.

Povey, M. J. W.; Wilkinson, J. M.

*British Poultry Science* 21 (6) 489-495 (1980) [14 ref. En] [Procter Dep. of Food Sci., Leeds Univ., Leeds LS2 9JT, UK]

Preliminary results are reported from work on application of ultrasonic pulse-echo techniques to albumen quality testing of the hen's egg. Measured values are presented for ultrasonic velocity and attenuation of compression waves in egg white of varying age, and of ultrasonic shear velocity in egg white. It is concluded that the ultrasonic technique could prove superior to other techniques for automatic, non-destructive testing of the hen's egg. AS

## 7

**Apparatus and method for beating an egg within its own shell.**

Stansbury, B. H., Jr. (Ronco Teleproducts Inc.)  
**United States Patent** 4 264 216 (1981) [En]

A relatively low-power egg beating device for scrambling an egg within its shell is described. The device includes a motor driven needle; the egg is fully impaled on the needle and the egg is beaten. A control device for the motor and brake device is included. The device has low power requirements and thus may be battery powered, fully self-contained and portable. AS

## 8

**Scientific survey of the chemical quality of farm and market eggs.**

Sengar, S. S.

**Poultry Guide** 18 (5) 38 (1981) [3 ref. En] J. V. Coll, Baraut, Meerut, India]

The proximate compositions of farm eggs (viz. eggs from modern chicken farm where foreign breeds are reared) and market eggs (viz. eggs from native, Indian breeds of chicken) were compared; no significant differences were found. Eggs from modern farms were generally larger than market eggs. CFTRI

## 9

**Quality and microbiological condition of shell eggs marketed in metropolitan Hyderabad.**

Qayyum, S. A.; Siddiqui, S. M.; Mahendranath, D.; Sreenivas Reddy, M.

**Indian Poultry Gazette** 64 (4) 135-141 (1980) [18 ref. En] [Coll. of Vet. Sci., Rajendranagar, Andhra Pradesh Agric. Univ., Hyderabad, Andhra Pradesh, India]

The quality of shell eggs marketed in Hyderabad was studied at four different levels, viz. (i) producer, (ii) assembler, (iii) wholesaler, and (iv) retailer. Egg wt. decreased while air-cell height increased as the eggs moved from (i) to (iv). The % of dirty eggs increased from 4.16 to 20.83%, and of cracked eggs from 4.16 to 12.5%, when eggs moved from (i) to (iv). Shell thickness proved to be independent of the market channel. Internal quality (albumen and yolk indices, Haugh units) also deteriorated from (i) to (iv), declining significantly at level (ii), and substantially at (iii) and (iv). The external microbial load varied from 1800 to 920 000/shell and 0-37 000/g egg contents; it increased from (i) to (iv). The recovery of *Corynebacterium* from the shell surface and contents was an unusual finding. CFTRI

## 10

**Egg quality as influenced by layer diet.**

Reddy, S. J.

**Poultry Guide** 18 (5) 31-34 (1981) [21 ref. En] [Dep. of Poult. Sci., Andhra Pradesh Agric. Univ., Hyderabad-500 030, India]

Effects of dietary iodine, F, Mn, riboflavin, biotin, pantothenic acid, folic acid, vitamin B<sub>12</sub>, vitamin A, vitamin D, vitamin E and vitamin K levels on egg quality are discussed, together with effects of Ca and CO<sub>3</sub><sup>2-</sup> on egg shell quality. CFTRI

## 11

**Studies on the repeatability of egg quality characteristics in Japanese quails (*Coturnix coturnix japonica*).**

Sreenivasiah, P. V.; Kanavikar, C. R.; Joshi, H. B.

**Kerala Journal of Veterinary Science** 11 (1) 136-140 (1980) [6 ref. En, malayalam] [Poultry Res. Div., Indian Vet. Res. Inst., Izatnagar, Uttar Pradesh, India]

371 quail eggs (from 66 female birds all similarly housed) were evaluated for external and internal quality. Egg wt. (g) gave a mean value of 8.93 ± 0.0687; shape index (%) 79.82 ± 0.2916; albumen index 0.1367 ± 0.0023; yolk index 0.5444 ± 0.0045; and shell thickness (mm) 0.1715 ± 0.0009. LH

## 12

**A method of freezing cooked eggs.**

Adams, R. E.

**British Patent** 1 585 894 (1981) [En]

Process for deep freezing cooked eggs by first freezing the white rapidly with liquid nitrogen to avoid formation of large water crystals, after which the yolk is frozen relatively slowly. IFT

## 13

**Problems associated with marketing of poultry and poultry products produced through small marginal farmers.**

Choudhary, M. R.; Saini, S. S.

**Poultry Guide** 18 (6) 57-62 (1981) [En] [Min. of Agric. & Co-Op., Gov. of India, India]

The development of the poultry industry in India since 1960, and the current efforts to modernize the marketing of poultry products are summarized. Export of eggs from India, the current systems of grading and selling of eggs in India and the recommendations for marketing of poultry and poultry products are considered. CFTRI

## 14

**[Recent studies on egg technology.] Neuere Arbeiten auf dem Gebiet der Eitechnologie. [Review]**

Scholtysssek, S.

**Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik** 30 (6) 237-239 (1979) [20 ref. De]

This review considers the following aspects; evaluation of shell strength; internal quality characteristics and their determination; changes in egg quality during storage; factors influencing pH and protein composition of egg albumen; electrophoretic identification of proteins in egg white foam and in the egg-white draining from such foam; selection for low cholesterol concn. in the yolk; sensory evaluation of eggs; and quality of eggs laid by hens housed under different conditions. AJDW

## 15

## Receiving device for bruisable objects.

Kattenbroek, H. J. van (Moba Holding Barneveld BV)  
**United States Patent 4 261 158 (1981) [En]**

A receiving device for bruisable objects, e.g. eggs, has receiving members extending obliquely and downwards, a pivot mechanism which pivots  $\geq 1$  receiving member downwards and outwards, and a restriction member to retard or hamper movement of the receiving member. RAW

## 16

## [Feed restriction of growing layer-type hens.]

Futterrestriktion bei Junghennen des Legetyps.

Scholtysek, S.

*Archiv für Geflügelkunde* 45 (3) 109-116 (1981) [6 ref. De, en, fr, ru] [Inst. für Tierhaltung & Tierzüchtung, Univ. Hohenheim, D-7000 Stuttgart 70, Federal Republic of Germany]

Groups of layer-type hens of 3 strains (Hisex, LSL, Shaver) were used in a study on effects of 2 protein levels (14 or 11%), 3 feeding levels (ad lib., 20% restriction, or no feed for 1 day/wk) and period on the grower ration (18, 20 or 22 wk) on growth, laying performance and egg quality. Tables of results are given, including data for the shell strength, elastic deformation, % shell, albumen height, and yolk index and yolk colour. The results show that strain significantly influenced all egg characteristics; protein level and feeding level significantly influenced only elastic deformation, whereas duration of feeding the grower ration influenced only albumen height and yolk colour. AJDW

## 17

## [Soy lecithin in laying hen diets.] Sojalecithin im Legehennenfutter.

Vogt, H.

*Archiv für Geflügelkunde* 45 (3) 116-120 (1981) [2 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Forschungsanstalt für Landwirtschaft, D-3100 Celle, Federal Republic of Germany]

Groups of laying hens were used in 280-day feeding trials with diets containing 0, 2, 4 or 6% soy lecithin (replacing maize meal or soybean oil). Effects on yolk composition, yolk colour, shell thickness and interior quality of eggs was studied. The results show that yolk colour was improved but shell thickness was impaired by dietary soy lecithin. Fatty acid composition of the yolk lipids was also affected, concn. of oleic acid decreasing and that of linoleic acid increasing with increasing soy lecithin content of the diet. Little effect of dietary soy lecithin on the proximate composition of the yolk or on other interior egg quality characteristics was observed. AJDW

## 18

## Hatchability of eggs and performance of SCWL and broiler breeder hens fed soybean meal and fababean meal diets.

Gardiner, E. E.; Dubetz, S.

*Canadian Journal of Animal Science* 61 (2) 449-452 (1981) [6 ref. En, fr] [Res. Sta. Agric. Canada, Lethbridge, Alberta T1J 4B1, Canada]

2 experiments were conducted to determine the effects of feeding fababean meal diets to laying hens. Body wt., feed consumption, egg production, egg wt., eggshell strength, and hatchability of eggs were the parameters recorded. In experiment 1, where 2 types of hens (Single Comb White Leghorn (SCWL) and broiler breeders) were maintained in floor pens, hens fed a diet containing fababean meal had lower final body wt., lower average egg wt., and lower percentage hatchability of eggs than those fed soybean meal. Feed utilization, egg production and eggshell strength were not significantly affected by diets. In experiment 2, in which SCWL were maintained in cages, hens fed diets containing 29.75% fababean meal required more feed/dozen eggs, had lower egg wt. and had lower percentage hatchability than hens fed diets containing 7.20% soybean meal. Body wt., feed/bird/day, egg production, and eggshell strength were not significantly affected by diets. Supplemental dietary lysine improved feed conversion and percent hatchability of eggs for hens fed the fababean diets. AS

## 19

## [Detection of ethopabate residues in eggs.]

Rutczynska-Skonieczna, E. M.

*Roczniki Państwowego Zakładu Higieny* 31 (2) 181-185 (1980) [9 ref. Pl, ru, en] [Państwowy Zakład Higieny, 00-791 Warsaw, Poland]

Homogenized eggs from hens not treated with drugs containing ethopabate were used as such or with addition of 0.75, 1.0 or 1.5 mg crystalline ethopabate/kg homogenate. 20-g samples were extracted with methanol diluted 2:1 with water; the extract was shaken repeatedly with chloroform in the presence of HCl and ethyl acetate. The combined chloroform layers were then taken to dryness in a stream of  $N_2$  at 60°C, the residue was dissolved in acetonitrile/water mixture (6:1), the solution was extracted by repeated shaking with light petroleum which was discarded, benzene was added to the solution which was then washed with 10% aqueous  $Na_2CO_3$  solution followed by water, filtered through anhydrous  $Na_2SO_4$ , and taken to dryness as above. The residue was dissolved in 0.1 ml methanol, and analysed by 2-directional TLC on silica gel using n-hexane + acetone (1:1). The ethopabate spot was visualized in UV light at 254 nm. The method was capable of detecting 0.75 mg ethopabate/kg egg homogenate; recovery was 80%. SKK

## 20

[Testing of egg products. Demonstration of pasteurization with  $\alpha$ -amylase tests.] Prüfung von Eierzeugnissen. Nachweis der Pasteurisierung mit dem  $\alpha$ -Amylasetest.

German Democratic Republic, Institut für Milchforschung der DDR

German Democratic Republic Standard TGL 24975/08, 3pp. (1978) [De]

This standard applies to whole egg, egg yolk, dried whole egg and dried yolk. Satisfactory pasteurization is to be demonstrated by a method involving incubation of  $\alpha$ -amylase in starch solution, precipitation of the albumen with trichloroacetic acid, filtration of the precipitate, and photometry following colour reaction of the starch substrate with I solution. Pasteurization is adequate when the spectrophotometer extinction value is  $> 0.2$ . KME

## 21

[Se supplementation of feed for chicks and laying hens.]

Herstad, O.; Hvidsten, H.

*Meldinger fra Norges Landbrukshøgskole* 60 (11) 14pp. (1981) [17 ref. No, en] [Inst. for Fjørte & Pelsdyr, Norges Landbrukshøgskole, As-NLH, Norway]

Studies were conducted to evaluate effects of Se supplementation of the diet on growth of chicks, and laying performance and tissue Se concn. of hens. A commercial diet (0.167 p.p.m. Se over the rearing period, and 0.273 p.p.m. Se in the laying period) and an experimental low-Se diet (0.064 p.p.m. Se in the rearing and 0.058 p.p.m. Se in the laying period) were fed either with or without addition of 0.1 p.p.m. Se as selenite. Tables of results are given, including data for Se concn. in liver, breast muscle and eggs. Se concn. in liver and breast muscle increased significantly with increasing Se content of the diet; Se content of eggs increased, but not significantly, with increasing dietary Se level. Yolk colour score increased significantly with increasing dietary Se level. AJDW

## 22

Organochlorine pesticide residues in eggs and milk available in Bombay markets.

Khandekar, S. S.; Noronha, A. B. C.; Banerji, S. A.

*Science and Culture* 47 (4) 137-139 (1981) [10 ref. En] [Dep. of Biochem., Inst. of Sci., Bombay-400 032, India]

Results of 2 surveys carried out during 1976-1979 on the occurrence of organochlorine residues in 43 milk samples procured from Government booths and local vendors and 37 egg samples collected from Bombay (India) are reported. The extent of contamination (p.p.m.) was HCH, 0.01-1.01; lindane, 0.01-0.78; heptachlor, 0.04-0.60; aldrin, 0.03-0.52; dieldrin, 0.12-2.5; and DDT, 0.47-2.1 CFTRI

## 23

[Packaging unit for several articles, made from foldable material in one piece.] Aus einem faltbaren Material hergestellte und aus einem einstückigen Zuschnitt bestehende Verpackungseinheit für mehrere Verpackungsgegenstände.

Stefanski, M. (Gebrüder Merten GmbH & Co. KG)

German Federal Republic Patent Application

2 908 520 (1980) [De]

A composite pack for foodstuffs, e.g. eggs, butter and margarine, is folded from a one-piece blank having a number of portions each folded through 90° relative to the adjoining portions. The portions comprise a base, 2 sides and a lid and form a number of individual packs separable along perforations at right angles to the folds. W&Co

## 24

The utilization of Censor meals by laying hens.

Ong, H. K.; Hutagalung, R. I.

*Malaysian Applied Biology* 7 (2) 99-103 (1978) [7 ref. En, my] [Anim. Production Div., MARDI, Serdang, Malaysia]

2 types of Censor meals (a byproduct from mechanical drying of palm oil effluents with absorbent feed materials) TK8 and TKG were used to replace maize in diets of 45 Shaver Starcross laying hens (age 25 wk), at 0, 25, 50, 75 and 100%. Egg quality was analysed and Haugh unit values were 80-81 in all treatments; yolk index was 0.41-0.43; albumen pH was 8.5-8.6; and shell wt./unit area (mg/cm<sup>2</sup>) was 74.95-79.71. The Censor-based diets decreased egg yolk pigmentation. LH

## 25

Studies on the allergenic structure of hen ovomucoid by chemical and enzymic fragmentation.

Kurisaki, J.; Konishi, Y.; Kaminogawa, S.; Yamauchi, K. *Agricultural and Biological Chemistry* 45 (4) 879-886 (1981) [26 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan]

The allergenic structure of ovomucoid was studied by fragmentation with BrCN and staphylococcal protease. 2 fragments obtained by BrCN cleavage were identified in the primary structure of ovomucoid to be peptide 1-68 and peptide 69-186 cleaved at position 84 and linked together by an SS bridge between 70 and 109. Allergenic activity, assayed by a passive cutaneous anaphylaxis inhibition test using IgE antibody from mouse, was retained only in peptide 69-186. Three fragments obtained by staphylococcal protease digestion corresponded to peptide 1-130 and 2 peptides 131-186 differing in carbohydrate content. Only peptide 1-130 was allergenic. The trypsin binding ability remained only in the allergenic peptides. These results suggest that either the common peptide portion in 1-130 and 69-186 or a long range structure composed of these peptides is essential for allergenic activity. AS

## 26

## [Detection of tylosin residues in eggs.]

Karkocha, I.

*Roczniki Panstwowego Zakladu Higieny* 31 (2) 173-175 (1980) [7 ref. Pl, ru, en] [Panstwowy Zaklad Higieny, 00-791 Warsaw, Poland]

Unsupplemented eggs and eggs with 2.5-10.0 µg tylosin added/50 g sample were used for the tests. The procedure was similar to that described for chloramphenicol detection [see FSTA (1980) 12 3Q44], except that the ethyl acetate extract was not deproteinized; and that the TLC chromatograms were developed 2-directionally with chloroform + acetone (60:40) and ethyl acetate + methanol (85:15), the tylosin spot being visualized in UV-light at 254 nm. The method detected 0.05 mg tylosin in 1 kg homogenized egg.

SKK

## 27

## Egg shell surface coating with edible material: effects on the quality of chicken eggs.

Yamanaka, Y.; Furukawa, N.; Yokokawa, Y. *Journal of Agricultural Science [Tokyo Nogyo Daigaku Nogatu Shuho]* 25 (1) 10-17 (1980) [13 ref. Ja, en] [Lab. of Utilization of Anim. Products, Dep. of Zootech. Sci., Tokyo Univ. of Agric., Setagaya, Tokyo, Japan]

An edible coating was applied to eggs within 24 h of laying. Treated and untreated eggs were then placed in an air conditioned room with an average temp. of 15.5°C and RH of 89% for 3, 7, 14, 21, 28 or 35 days. After storage, the eggs were weighed, candled to measure air cell height, and broken to measure the albumen and yolk heights, and albumen pH. Haugh unit values for coated eggs were > 56 after 21 days of storage, whereas those for untreated eggs decreased rapidly to < 56 after 7 days and < 43 after 21 days of storage. Coated eggs had higher albumen and yolk heights than untreated eggs, and the coating also decreased the change in air cell height during storage. A rapid increase in the pH of the albumen was observed in untreated eggs, reaching a peak of 9.1 after 7 days of storage. Among coated eggs, the pH increased gradually, and reached 8.8 after 35 days. Some untreated eggs rotted or had broken yolks after 14 days of storage; the coating process reduced the incidence of these defects. [From En summ.] JRR

## 28

## The effect of dietary alfalfa of varying saponin content on yolk cholesterol level and layer performance.

Nakaue, H. S.; Lowry, R. R.; Cheeke, P. R.; Arscott, G. H.

*Poultry Science* 59 (12) 2744-2748 (1980) [18 ref. En] [Dep. of Poult. Sci., Oregon State Univ., Corvallis, Oregon 97331, USA]

Diets involving low (0.03%) or high (0.62%) saponin sun cured alfalfa meal were fed to Single Comb White Leghorn pullets. No significant differences were found in the level of yolk cholesterol, Haugh units, sp. gr. or incidence of blood spots of eggs laid by hens receiving the different diets. JRR

## 29

## [Studies on the nutritive values of various calcium supplements in laying hen diets. I. Comparative studies on the nutritive values of oyster shell, limestone and calcitic limestone.]

Han, I. K.; Lee, K. H.; Lee, S. J.; Kang, T. H.; Kwon, K. *Korean Journal of Animal Science [Hanguk Ch'eksan Hakhoe Chi]* 23 (3) 193-198 (1981) [15 ref. Ko, en] [Livestock Exp. Sta., Suweon, S. Korea]

Nutritive values of (i) limestone, (ii) calcitic limestone, and (iii) oystershell for 1200 White Leghorn laying hens were examined in a 22-wk period. Different Ca sources did not affect average egg wt. significantly, although egg shell thickness was affected, being 0.346, 0.339, and 0.359 mm in (i)-(iii), resp. The ratio of eggshell wt. to egg wt. was similarly affected by Ca source. It is suggested that all 3 Ca sources could be useful to laying hens. [From En summ.] LH

## 30

## [Studies on the nutritive values of various calcium supplements in laying hen diets. II. Effects of varying levels of dietary calcium on egg production, feed efficiency and egg shell quality.]

Han, I. K.; Lee, K. H.; Lee, S. J.; Kang, T. H.; Kwon, K. *Korean Journal of Animal Science [Hanguk Ch'eksan Hakhoe Chi]* 23 (3) 199-205 (1981) [25 ref. Ko, en] [Livestock Exp. Sta., Suweon, S. Korea]

Levels of dietary Ca of 1.75, 2.25, 2.75, 3.25 and 3.75% for 1500 White Leghorn hens over a 22-wk period were studied. Average egg wt. was not affected by Ca level; ratio of eggshell thickness and shell wt. to egg wt. significantly ( $P < 0.05$ ) increased as Ca level increased, reaching a plateau at 3.25%. [From En summ.] [See preceding abstr. for part I.] LH

## 31

## [Studies on the nutritive values of various calcium supplements in laying hen diets. III. Effects of particle size and the source of calcium supplements on the egg production and egg shell quality.]

Song, M. K.; Han, I. K.; Lee, K. H.; Kwack, C. H. *Korean Journal of Animal Science [Hanguk Ch'eksan Hakhoe Chi]* 23 (3) 206-212 (1981) [11 ref. Ko, en] [Coll. of Agric., Seoul Nat. Univ., Seoul, S. Korea]

A total of 240 Single Comb White Leghorn hens, 39 wk old, were fed coarse, medium or fine (i) limestone or (ii) oystershell for 12-wk. No effect was noted on egg wt., eggshell wt./egg wt. ratio, eggshell thickness, and Ca content in the shell, but slightly better eggshell quality was noted in hens fed coarse (ii). Soft and shell-less egg production was insignificantly higher for fine particle fed hens and those fed (ii). Generally, coarse (ii) was the most suitable, although laying performance was slightly adversely affected. [From En summ.] [See preceding abstr. for part II.] LH

**32****The effect of egg carton and case type on egg shell damage.**

Denton, J. H.; Mellor, D. B.; Gardner, F. A.

*Poultry Science* 60 (1) 145-150 (1981) [11 ref. En]  
[Poultry Sci. Dep., Texas Agric. Extension Service,  
Texas A&M Univ., College Station, Texas 77843, USA]

Studies were conducted to evaluate the protection against egg shell breakage offered by 6 types of commercially available one dozen egg cartons and to evaluate, in addition, 3 case types: 15 dozen wire, 24 dozen wire, and 30 dozen cardboard. Two trials were conducted in cooperation with a Texas commercial egg processing plant who supplied the eggs and test facility. Eggs were hand candled to remove damaged eggs, packed in cartons and cases, and subjected to damage by vertical drop of 12 in. Hand candling was used to determine the extent of damage. The 30 dozen cardboard case afforded the greatest degree of protection (7.87% shell damage) and the 24 dozen wire case offered the least protection (20.75% shell damage). Comparison of the 6 carton types (3 moulded pulp, 3 plastic foam) indicated that greatest protection was offered by 2 moulded pulp varieties (9.00 and 9.36% shell damage) and the least protection was afforded by 1 moulded pulp and 2 plastics foam varieties (17.21, 16.30, and 20.79% damage, resp.). Two carton types that offered the greatest protection possessed strong support in the centre of the carton, which tended to resist damage from the downward impact utilized in this test. AS

This publication gives the full text of papers presented at this symposium, including the following which give information on quality of eggs or poultry carcasses. Effects of early nutrient retention on broiler breeder reproduction, by J. H. Soares, Jr., M. A. Ottinger, P. Laurans & J. T. Allen (pp. 15-18, 5 ref.). Feeding the pullet for early maturity, by S. Leeson (pp. 18-25, 13 ref.). Influence of genotype and diet on the incidence of leg weakness in roaster chickens, by H. W. Hulan & F. G. Proudfoot (pp. 40-50, 10 ref.). AJDW

**35****[Studies on the quality of locally produced eggs during marketing and distribution. I. Seasonal variation in the quality of market eggs.]**

Ahn, B. Y.; Kim, J. W.; Lee, Y. B.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 23 (2) 81-86 (1981) [11 ref. Ko, en] [Korea Inst. of Sci. & Tech., Seoul, S. Korea]

A total of 3000 eggs was collected over a 1-yr period from 5 local market channels and evaluated for seasonal variation in egg quality. Average eggshell thickness was 0.36 mm (0.33 mm in summer up to approx. 0.37 mm in winter); % shell breakage was more related to environmental temp. than to shell thickness, being therefore higher in winter. Haugh unit score and yolk index were, resp. 70 and 0.44 in Dec.-April, vs. 52 and 0.35 in June-July; pH of whole eggs was 7.2-7.4 in Dec.-April, vs. 7.8-8.0 in May-July and Nov. To minimize seasonal variation in egg quality, improvement of the marketing system is recommended. [From En summ.] LH

**33****[Current state of harmonization of veterinary legislation in the EEC.] Stand der Harmonisierung auf dem Gebiet des Veterinärrechts in der Europäischen Gemeinschaft.**

Schulte, F.; Bohm, H. D.; Chaumet, J.; Heuner, F.; Raschke, E.; Steinert, J.

*Archiv für Lebensmittelhygiene* 32 (3) 59-64 (1981)

[De, en] [Bundesministerium für Jugend, Familie &amp; Gesundheit, 5300 Bonn-Bad Godesberg, Federal Republic of Germany]

Current harmonization of veterinary legislation in the EEC is reviewed, with detailed consideration of legislation on meat and poultry hygiene, milk and dairy products, eggs, and guidelines for foods of animal origin (including provisions on the use of drugs and hormones). RM

**34****Proceedings of the Maryland Nutrition Conference for Feed Manufacturers, March 19 & 20, 1981.**

[Conference proceedings]

United States of America, University of Maryland;

United States of America, Maryland Feed Industry Council Inc.; United States of America, American Feed Manufacturers Association

iv + 106pp. (1981) [many ref. En] Maryland, USA;  
University of Maryland. Price \$2.50; £2.55**36****[Studies on the quality of locally produced eggs during marketing and distribution. II. Comparison of quality in eggs marketed through different channels.]**

Ahn, B. Y.; Kim, J. W.; Lee, Y. B.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 23 (2) 87-91 (1981) [10 ref. Ko, en] [Korea Inst. of Sci. & Tech., Seoul, S. Korea]

Eggs [as in previous abstr.] were examined for the effect of different market channels, i.e. (i) producers cooperative, (ii) agricultural cooperative, (iii) wholesale + retailer I, (iv) wholesale + retailer II, and (v) small retailer, on quality. % shell breakage, shell cleanliness, and air cell size were 3.5%, 2.2 (on a 1-5 scale), and 2.2 mm for (i), vs. 5.7%, 2.5 and 3.0 mm for (v). Average Haugh unit value was 68.4 and yolk index 0.45 in (i) vs. 57.0 and 0.40 in (v). Improvement and simplification of market channels is recommended. [From En summ.] LH

**37****[Studies on the quality of locally produced eggs during marketing and distribution. III. Effects of washing treatment and storage temperature on egg quality.]**

Ahn, B. Y.; Kim, J. W.; Lee, Y. B.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 23 (2) 92-96 (1981) [10 ref. Ko, en] [Korea Inst. of Sci. & Tech., Seoul, S. Korea]

Eggs were collected [see previous 2 abstr.] and examined for microbiological contamination, and the effect of storage on wt loss and egg quality. Degree of shell cleanliness affected microbial contamination, i.e. heavily stained eggs had  $3.2 \times 10^7$  organisms/shell, moderately stained eggs  $1.9 \times 10^6$ /shell, and clean eggs  $2.7 \times 10^5$ /shell. Number of organisms increased on storage at room temp. (25–30°C) or at 4°C; washing with a 130 p.p.m. free chlorine solution reduced microbial numbers by a factor of 1000. Fresh eggs could be stored at 16°C for up to 2 wk without quality deterioration, vs. storage at 25–30°C which adversely affected quality within 4 days. [From En summ.] LH

38

[Account of the Fifth Breuer-Semsey Symposium, held in Veszprem, Sept. 21–22, 1979, in connection with the 1979 Hungarian Veterinary Society's Conference.] [Conference proceedings] Hungary, Fifth Breuer-Semsey Symposium *Magyar Allatorvosok Lapja* 35 (3) 147–192 (1980) [Hu]

Abstracts are given of papers presented at this title Symposium, held in connection with the 'Hungarian Veterinary Scientific Days'. Papers include: Production of foods of animal origin, by L. Denes (p. 147), in which changes in quantity and quality of foods of animal origin in Hungary during the last 5 yr are discussed. The role of veterinary service in food production, by A. Glozik (p. 150), in which the importance of food hygiene and scientific research carried out by veterinarians is stressed. Animal hygiene in the service of improving food quality, by F. Kovacs (p. 159), in which it was emphasized that good quality foods can be obtained only from healthy and well-kept animals. The effect of genetic factors on the quality of animal products, by J. Dohy, I. Boda & G. Kovach (p. 155), in which the importance of genetic factors on the quality and quantity of milk, meat and eggs is discussed. The role of bioactive substances in the production of animal products, by J. Bokori (p. 160), in which the effects of vitamins, various amino acids, microelements, enzymes, and hormones on the quality of animal products are described. Pharmaceutical and toxicological aspects of animal products, by F. Simon (p. 162), in which the possible occurrence of residues of pharmaceutical and toxic products (hormones, antibodies, pesticides, etc.) in foods of animal origin is discussed. Effect of environmental hygiene on quality of milk, by I. Facsar (p. 163), in which conditions necessary for obtaining milk with  $\leq 100\,000$  live microorganisms/ml in dairies are discussed in connection with environmental hygiene, especially clean milking equipment. Importance of animal husbandry in food hygiene, by G. Szovatay (p. 165) in which the elimination of infections, toxic or radioactive materials carried by sewage and waste water is advocated together with the safe disposal of culled carcasses and animal waste products. [Continued in following abstr.] ESK

39

Barcode presents problems to egg pack makers. Anon.

*Poultry International* 19 (13) 58, 60, 62, 110, 114 (1980) [En, de, fr, es, it, ja, ar]

Problems with application of optically-scannable bar codes to egg packs are discussed; these are due to the relatively low-cost rough-finish pack material and non-sophisticated printing normally used on egg packs. Positioning of the bar code on the packs is also discussed. Stick-on labels are unlikely to be an acceptable solution, due to the likelihood of their being damaged or becoming attached to other items. Problems with application of bar codes to packs for poultry products are comparatively slight. AJDW

40

Egg washing wastewater characterization and treatability.

Hauser, J. R.; Hills, D. J.

*Poultry Science* 60 (5) 961–968 (1981) [11 ref. En] [Dep. of Agric. Eng., Univ. of California, Davis, California 95616, USA]

41

The effect of sodium fluoride on egg production, egg quality, and bone strength of caged layers.

Merkley, J. W.

*Poultry Science* 60 (4) 711–776 (1981) [11 ref. En] [USDA, Sci. & Education Administration, Agric. Res., Poultry Res. Lab., RD 2, Box 600, Georgetown, Delaware 19947, USA]

Fluoridation of water presented to White Leghorn pullets from 20 to 45 wk of age at 100 p.p.m. increased the breaking strength of both humeri and tibiae. Egg quality (egg wt., shell strength and thickness, and Haugh units) and rate of egg production were not affected by the fluoridation treatment. JRR

42

Studies with clinoptilolite in poultry. I. Effect of feeding varying levels of clinoptilolite (zeolite) to Dwarf Single Comb White Leghorn pullets and ammonia production.

Nakaue, H. S.; Koelliker, J. K.

*Poultry Science* 60 (5) 944–949 (1981) [7 ref. En] [Dep. of Poultry Sci., Oregon State Univ., Corvallis, Oregon 97331, USA]

Clinoptilolite, a naturally occurring zeolite with the formula  $[(\text{Na}_4\text{K}_4)(\text{Al}_2\text{Si}_{40}\text{O}_{96}) \cdot 24\text{H}_2\text{O}]$ , has an ion-exchange affinity for ammonium ion. Rations containing 0, 2.5, 5.0 and 10.0% clinoptilolite fed for 28-day periods had no effect on egg wt., shell quality or interior egg quality. JRR

43

Egg pack type influences egg weight loss and mould growth.

Anon.

*Poultry International* 19 (13) 44 (1980) [En]

A brief account is given of studies on wt. loss of and mould growth on eggs stored in various pack types

(pulp trays, pulp egg packs, card/clear plastics packs, polystyrene packs, clear plastics packs) for 14 or 21 days at 22°C, 75% RH. The results show that pulp trays gave the highest wt. loss and the lowest incidence of mould growth, whereas the clear plastics packs gave the lowest wt. loss and the highest incidence of mould growth. AJDW

#### 44

[Presentation lid for insertion on honeycombed trays for carrying eggs.]

Haerty, H. (Cartorhin SA)

French Patent Application 2 473 295 (1981) [Fr]

The lid for an egg box is assembled from a flat blank in e.g., corrugated cardboard, already provided with adhesive at the corners so that it may be folded and glued to form a top portion with 4 sides. The top includes a window through which the eggs may be viewed, which is released by folding 2 flaps on the blank downwards so that castelated portions on these engage with the honeycomb shape of the egg box. The complete packaging is enveloped in heat shrinkable film. W&Co

#### 45

[Studies on pasteurization and quality maintenance of egg for industrial use. IX. Evaluation of disc gel electrophoresis of heat-denatured egg proteins for detecting the pasteurization of liquid eggs.]

Yamanaka, Y.; Nonami, Y.; Furukawa, N.; Nakae, T.

*Japanese Journal of Dairy and Food Science [Rakuno Kagaku Shokuhin no Kenkyu]* 29 (2) 85-90 (1980)

[15 ref. Ja, en] [Dep. of Anim. Sci., Tokyo Univ. of Agric., Sakuragaoka, Setagaya-ku, Tokyo, Japan]

A method for detection of pasteurization of liquid egg is described, based on disc gel electrophoresis. Electrophoretograms of non-pasteurized liquid egg white and yolk, and of samples pasteurized at temp.  $\leq 63^\circ\text{C}$  are presented, including electrophoretograms stained with Amido Black 10B, Periodic acid-Schiff stain or Sudan I. 10 protein bands were observed for egg yolk, 9 for egg white and 13 for whole egg; some of these disappeared or decreased in intensity as a result of heat treatment. The electrophoretogram contained a band not present in either yolk or egg white; it is suggested that this is formed by interaction of egg white and yolk proteins. Electrophoretic patterns of glycoproteins were not affected by pasteurization. Some lipoprotein bands disappeared or were reduced in intensity after heat treatment at temp.  $\geq 57^\circ\text{C}$  for 30 min. The use of disc gel electrophoresis for detection of pasteurization of liquid egg is discussed on the basis of these results. AJDW

#### 46

[Whole egg from fresh eggs. Whole egg liquid: frozen whole egg.] Vollei aus frischen Eiern. Vollei flüssig:

Vollei gefroren.

VVB Industrielle Tierproduktion

German Democratic Republic Standard TGL 32921, 6pp. (1979) [De]

This standard applies to fresh eggs, liquid or frozen, pasteurized (categories I and II) or unpasteurized, and covers sensory assessment, packaging, transport (frozen, at  $\leq -15^\circ\text{C}$ ; liquid, at  $\leq +5^\circ\text{C}$ ) and storage

(frozen pasteurized,  $< 12$  months at  $-18^\circ\text{C}$ ,  $< 15$  months at  $-21^\circ\text{C}$ ,  $< 22$  months at  $-28^\circ\text{C}$ ; frozen unpasteurized,  $< 8$  months at  $-18^\circ\text{C}$ ,  $< 12$  months at  $-21^\circ\text{C}$ ,  $< 17$  months at  $-28^\circ\text{C}$ ; liquid,  $< 24$  h before processing or freezing at  $\leq -30^\circ\text{C}$ ). Pasteurization shall inactivate  $\alpha$ -amylase. For both liquid and frozen whole eggs bacterial counts (/ml) shall be  $\leq 10^6$  for unpasteurized or pasteurized grade II egg, and  $3 \times 10^5$  for pasteurized, grade I, egg; coliforms shall be absent in  $10^{-3}$  ml for unpasteurized or pasteurized grade II egg, and absent in  $10^{-2}$  ml for pasteurized, grade I egg; salmonellae and shigellae shall be absent in 25 ml, and enterotoxin-forming staphylococci shall be absent in 0.1 ml. KME

#### 47

Determination of selenium in biological materials by stable isotope dilution gas chromatography-mass spectrometry.

Reamer, D. C.; Veillon, C.

*Analytical Chemistry* 53 (14) 2166-2169 (1981) [34 ref. En] [Human Nutr. Res. Cent., USDA, SEA, Building 307, Room 215, Beltsville, Maryland 20705, USA]

Se was determined quantitatively in biological samples after digestion using  $\text{HNO}_3$ , orthophosphoric acid, and  $\text{H}_2\text{O}_2$  and the formation of 5-nitropiazelenol. Samples were spiked with enriched  $^{82}\text{Se}$  and isotopic ratio of  $^{80}\text{Se}$  to  $^{82}\text{Se}$  was measured by combined gas chromatography-MS using dual ion monitoring. Precise detn. at the parts/billion level is possible. Accuracy of the method was verified by using standard reference materials (NBS bovine liver, wheat flour, rice flour). Results obtained for Se concn. in egg white and egg yolk were in good agreement with the DAN fluorimetric method. AL

#### 48

Cottonseed meal in poultry diets.

Waldroup, P. W.

*Feedstuffs* 53 (52) 21-24 (1981) [21 ref. En] [Dep. of Anim. Sci., Univ. of Arkansas, Fayetteville, Arkansas 72701, USA]

Use of cottonseed meal as an ingredient of poultry diets is discussed, with special reference to problems with residual gossypol and cyclopropenoid fatty acids, the wt. and quality of eggs laid by hens fed cottonseed meal, and occurrence of yolk defects and pink discoloration in eggs of hens fed cottonseed meal. AJDW

#### 49

The effect of feeding rapeseed meal with and without added gums on the performance of laying hens.

Hulan, H. W.; Proudfoot, F. G.

*Annual Report, Research Station, Kentville, Nova Scotia* pp. 212-220 (1980) [En]

Groups of Single Comb White Leghorn hens were fed diets with gum-containing or gumless Tower (*Brassica napus*) or Candle (*Brassica campestris*) rapeseed meal, or gumless Tower rapeseed meal with added Candle var. gum. Effects on growth, egg wt., feed efficiency and the shell strength (sp. gr.) and Haugh unit score of the eggs were evaluated. Tables of results are

given. There was a tendency for gum-containing Candle rapeseed meal to give lower shell strength than the control diet after approx. 189 days of the trial; this effect disappeared after 322 days. After 490 days on the experimental diets, egg sp. gr. was better for groups fed Tower rapeseed (with or without gums) than for controls. Tower rapeseed meal, with or without gums, did not significantly influence Haugh scores. The highest Haugh scores were observed for gum-containing Candle rapeseed meal; degumming of this reduced Haugh score. Addition of Candle var. gum to Tower var. meal had no effect on Haugh score. AJDW

## 50

**[Classification and properties of eggs and egg products in industrial manufacture of pastry products.]**

Delmer, M.

*Revue des Industries de la Biscuiterie, Biscoterie, Chocolaterie, Confiserie* No. 43, 5, 7-9, 11 (1981) [Fr]

Topics discussed in this brief paper on industrial uses of eggs in pastry manufacture include the composition of the white and the yolk fractions, criteria for classification of eggs into classes A, B and C, and requirements for egg products other than shell eggs. Commercial egg products are surveyed, including liquid, frozen, powdered and concentrated types, and the functional properties of eggs in food systems are discussed. Practical tests for foaming ability and other properties are described. JRR

## 51

**The effects of storage duration on nondestructive deformation, quasi-static compression strength, impact fracture strength, and specific gravity of eggs from White Leghorn hens.**

Hamilton, R. M. G.; Thompson, B. K.

*Poultry Science* 60 (3) 517-522 (1981) [17 ref. En]  
[Anim. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Canada K1A 0C6]

Three experiments were done to determine the effects of storage duration on egg shell strength. Groups of 30 to 48 eggs were stored in air in vinyl plastics bags at 10°C for up to 21 days after oviposition. Quasi-static compression fracture force, sp. gr. and egg wt. in air and in water tended to decrease with time, while impact fracture force tended to increase. These trends were consistent across experiments. Nondestructive deformation, however, appeared to decrease in one experiment and increase in another. The sp. gr. was lower when measured by the flotation procedure than by Archimedes' principle. Because egg wt. changed at the same rate in air and in water, the decrease in sp. gr. can be attributed to the loss in wt. The changes in compression and impact fracture strength of the eggs indicated that material and structural properties of the shell were influenced by the length of storage. AS

## 52

**[Effect of zeolite in the feed of hens on the parameters of commercial eggs.]**

Szabo, I.; Kota, M.; Juhasz, I.

*Baromfitenyesztes es Feldolgozas* 28 (3) 97-101 (1981) [Hu] [Agrartudomanyi Egyetem, Debrecen, Hungary]

Experimental results showed that 9% zeolite in the feed of laying hens had no significant effect on most parameters of the eggs (wt., numbers of damaged eggs, etc.). The increased Fe concn. found in the yolk of eggs laid by zeolite-fed hens could increase their nutritive value. ESK

## 53

**40th Minnesota Nutrition Conference, 1979.**

[Conference proceedings]

Donker, J.; Wagner, G. (United States of America, University of Minnesota; United States of America, American Feed Manufacturers Association) (Editors)  
170 pp. (1979) [many ref. En]

These conference proceedings give the full text of papers presented at this symposium held on 17-18 Sept. 1979, including: Egg size, interior egg quality and leg weakness as influenced by nutrition, by L. S. Jensen (pp. 95-103, 24 ref.). AJDW

## 54

**[Bacterial flora of fresh eggs, and eggs stored for 4 weeks.]**

Gesche, E.; Schuler, A. M.

*Alimentos* 4 (3) 11-13 (1979) [9 ref. Es, en] [Inst. de Higiene & Salud Publica, Univ. Austral, Valdivia, Chile]

Studies were conducted on the bacteriological quality of (i) fresh eggs and (ii) eggs stored for 4 wk at ambient temp. No positive results were obtained from albumen or yolk samples. Fresh eggs had an average log count/total shell surface of 3.75 (range 3.45-4.14) vs. an average of 3.45 (range 3.10-4.23) for the stored eggs. % relative importance of various genera and groups of bacteria on the shell surface of fresh eggs were: *Micrococcus* 61.31; *Staphylococcus* 31.16; *Bacillus* 5.53; *Pseudomonas* 0; *Enterobacteriaceae* 0.50; *Acinetobacter* 1.00; and *Xanthomonas* 0.50. Corresponding values for the stored eggs were 39.20, 24.12, 29.15, 3.51, 2.01, 2.01 and 0. Gram-negative bacteria comprised 2.00% of the shell flora of fresh eggs, vs. 7.53% for stored eggs. AJDW

## 55

**The use of brewers dried grains by laying hens.**

Onwudike, O. C.

*Nutrition Reports International* 24 (5) 1009-1016 (1981) [10 ref. En] [Dep. of Anim. Sci., Univ. of Ife, Ile-Ife, Nigeria]

160 laying birds of the Harco breed which had been in lay for about 10 wk were fed 5 dietary treatments, containing (i) 0, (ii) 10, (iii) 20, (iv) 30, and (v) 40% brewers dried grains for an 8-month period. Laying performance of the hens was studied. In (i)-(v) average egg wt. (g) was 59.3, 59.7, 60.9, 62.4 and 62.3; albumen (as % of egg wt.) was correspondingly 55.6, 55.9, 57.4, 58.7 and 58.2; yolk (as % of egg wt.) was 33.2, 32.8, 32.5, 31.2 and 30.8. Economics of this study were also examined and it is concluded that (iv) is the most appropriate level for laying birds. LH

## 56

**Influence of strain, housing and season on egg quality traits in White Leghorn pullets.**  
 Jaya Prasad, A.; Kothandaraman, P.; Kadirvel, R.; Krishnan, A. R.  
*Cheiron* 10 (2) 63-66 (1981) [13 ref. En] [Dep. of Poultry Sci., Vet. Coll., Madras-600 007, India]

Groups of (i) purebred or (ii) commercial hybrid White Leghorn pullets were reared in 5-hen cages or in a deep litter system, over the period 27-48 wk of age (Dec.-May). Egg quality was evaluated at 4-wk intervals. A table of results is given. (i) eggs were heavier, had inferior shell characteristics but higher yolk indices than (ii). Cage-reared hens laid heavier eggs with better shell characteristics and larger yolks but poorer yolk indices than floor-reared hens. Neither strain nor housing system significantly influenced albumen characteristics. Albumen index, Haugh score, yolk index and shell characteristics all deteriorated with increasing hen age. Incidence of blood spots and meat spots was highest in eggs laid by (i) and by cage-housed birds. AJDW

## 57

**Quality attributes of whole egg and albumen mixtures cooked by different methods.**

Chen, T. C.; Hsu, S. Y.

*Journal of Food Science* 46 (4) 984-986 (1981) [14 ref. En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Whole egg and albumen mixtures were prepared and cooked by the following methods: pan scrambled in a double boiler; pan scrambled in a Teflon coated skillet; boil-in-bag in boiling water; and cook-in-bag in a microwave oven. Yields, weeping, and content of volatile flavour components in the cooked products were measured. Cooking yields were higher for those cooked by the boil-in-bag and cook-in-bag methods than for those pan scrambled. Regardless of cooking method, yields of the albumen product were lower than the whole egg product. Products prepared by the cook-in-bag method had lower weeping %. The methods of cooking affected the major volatile contents of the products slightly. Double boiler scrambled whole egg product contained less  $H_2S$ ,  $NH_3$  and total carbonyls than those prepared by other methods. IFT

## 58

**[A modified spectrophotometric method for the determination of iodine in eggs.]**

Park, J. M.; Han, S. N.; Lee, M. H.

*Korean Journal of Veterinary Public Health* 5 (1) 15-18 (1981) [7 ref. Ko, en] [Inst. of Vet. Res., ORD, Seoul, S. Korea]

A method for detn. of iodine in iodine-enriched eggs is described. Egg yolk and white are digested in ethanol and KOH to convert free and protein-bound iodine to KI; samples are dried, ashed at 500°C/4 h, and KI in ash is extracted and washed; KI is treated with 6N  $H_2SO_4$  and 3%  $H_2O_2$  to liberate iodine, which is subsequently extracted with chloroform and determined spectrophotometrically at 510 nm. Carbon tetrachloride

and carbon disulphide would be better solvents for iodine, but were thought too toxic and difficult to handle, and there was sufficient iodine in iodine-enriched eggs for chloroform to be sufficiently effective. Iodine contents in normal eggs, iodine-enriched eggs (albumen and yolk) and seaweeds was evaluated by this procedure, and results are tabulated. [From En summ.] LH

## 59

**Incorporation of selenium into egg proteins after feeding selenomethionine or sodium selenite.**

Latshaw, J. D.; Biggert, M. D.

*Poultry Science* 60 (6) 1309-1313 (1981) [9 ref. En] [Dep. of Poultry Sci., Ohio Agric. Res. & Development Cent., 674 W. Lane Avenue, Columbus, Ohio 43210, USA]

An experiment was conducted to determine if Se incorporation into egg proteins could be predicted on the basis of methionine or cystine content. Chickens in egg production were fed a basal diet or the basal diet supplemented with 0.2 or 0.4 p.p.m. Se from selenite or 0.2 or 0.4 p.p.m. Se from selenomethionine. Eggs were collected from each group after feeding the diet 18 days. All of the egg white proteins and yolk fractions prepared contained Se, and all of them increased in Se when more was fed. The increase in Se in egg white proteins after feeding selenite did not appear to be related to the cystine content of the proteins. However, the increase in Se in egg white proteins after feeding selenomethionine appeared to parallel the methionine content of the proteins. The Se level of yolk fractions was more closely related to the cystine content. Livetin fractions had the highest Se level, and low density fractions had the lowest. The data suggest that proteins synthesized in a tissue will have predictable amounts of Se but that proteins from different tissues will have different patterns of Se incorporation. AS

## 60

**[Preservation of eggs.]**

Collin, D.

*Tecnologie Alimentari* 4 (9) 44-46 (1981) [It]

Aspects discussed include: spoilage of eggs; refrigerated storage of shell eggs; controlled atm storage of shell eggs; freezing of liquid egg; and pasteurization by irradiation. AJDW

## 61

**[Variations in the mass of goose eggs during storage.]**

Lazar, V.; Spacek, F.; Kriz, L.

*Acta Universitatis Agriculturae Facultas*

*Agronomica, Brno* 25 (4) 141-147 (1977) [11 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

Changes in wt. were recorded during 14 days' storage of 2091 goose eggs. Tabulated results showed large variations in wt. loss (> 20%) and highly significant differences in wt. of eggs stored for 1 day or  $\geq 3$  days. These differences became more pronounced during storage; after 12 days storage all the eggs showed significant to highly significant wt. losses, confirming the Czechoslovak standard CSN 46 6409 requirement for a max. of 7 days' storage. RM

## 62

[Variations in the weight of goose eggs with laying cycles and years.]

Lazar, V.; Spacek, F.; Kriz, L.

*Acta Universitatis Agriculturae Facultas*

*Agronomica, Brno* 26 (3) 175-180 (1978) [12 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

11 512 goose eggs (Rhine breed) laid during 4 laying cycles (2 yr) were individually weighed. Tabulated results revealed the following wt. ranges (g) for cycles 1 to 4: 127.27-140.65; 168.87-171.11; 163.48-172.89; and 179.35-185.90. Most samples were within the wt. range 130-179 g in the first yr, 160-189 in the second yr. 90.28% complied with the Czechoslovakian Standard 46 6409; 8.24% were below and 1.48% above the standard requirements. RM

## 63

[Effect of illumination regimes on growth and development of quails.]

Afanas'ev, G. D.; Dardykina, O. N.; Efimova, A. A.; Lauda, I. V.; Sidorova, M. V.; Fomina, M. V.

*Doklady TSKhA /Sel'skokhozyaistvennaya*

*Akademiya imeni K. A. Timiryazeva* No. 250, 106-110 (1979) [Ru] [Timiryazevskaya Sel'skhokhoz. Akad., Moscow, USSR]

6 groups, each of 25 male and female Faraon quails were reared under the following conditions of illumination: (i) continuous 8 h daily at 5 lux; (ii) as (i) at 25 lux; (iii) alternating 1 h light at 5 lux and 2 h darkness; (iv) as (iii) at 25 lux; (v) diminishing from 16 to 8 h daily at 5 lux; and (vi) as (v) at 25 lux. The birds were killed at 56 days of age. Mean values with s.e. and significance levels are tabulated for wt. of carcass, all muscles, skeleton, internal organs, respiratory organs, excretion organs, heart, digestive organs, liver, reproductive organs and thymus of males and females in (i)-(vi) groups, against the backgrounds of live wt. of 137, 127, 158, 155, 138 and 141 g resp. for females, and of 130, 125, 119, 129 and 137 g resp. for males. Best muscle:bone ratios were in groups (i) and (ii), and least satisfactory ratios in (iii) and (iv). Effects of the different illumination regimes on egg laying performance are discussed. SKK

## 64

Determination of residual diaveridine and sulfaquinoxaline in hen's egg, chicken plasma and tissues by high-performance liquid chromatography.

Sakano, T.; Masuda, S.; Amano, T.

*Chemical & Pharmaceutical Bulletin* 29 (8) 2290-2295 (1981) [6 ref. En] [Shionogi Res. Lab., Shionogi & Co. Ltd., Sagisu, Fukushima-ku, Osaka, 553, Japan]

A HPLC method for detn. of residues of the antibacterial agents (i) diaveridine and (ii) sulfaquinoxaline in hens' eggs and in the plasma, liver, kidney, heart, spleen, muscle, gizzard, skin and fat of chickens was developed. Specific methods for residue extraction and extract clean-up are given for the various tissues studied. The purified extracts are then

separated by HPLC, using an RP-18 pre-column, and a Nuclosil 10C<sub>18</sub> analytical column, with 0.05M phosphate buffer/acetonitrile mobile phase (3:1 for eggs and plasma, 77:23 for the other tissues). A UV detector operating at 254 nm is used. Recovery was 53-95% for (i) and 63-99% for (ii); peak height or area was linearly related to concn. over the injected vol. range 10 ng-10 µg for (i) and 1 ng-10 µg for (ii). Data are presented for residual (i) and (ii) in yolk and albumen of eggs laid by hens (receiving 0.6% of a (i)/(ii) mixture in the drinking water) for 10 days after withdrawal of the bactericide mixture. (i) disappeared from yolk after 6 days and albumen after 2 days; corresponding values for (ii) were 9 and 5 days resp. AJDW

## 65

Rapeseed meal tannins and egg taint.

Fenwick, G. R.; Pearson, A. W.; Greenwood, N. M.; Butler, E. J.

*Animal Feed Science and Technology* 6 (4) 421-431 (1981) [32 ref. En] [ARC Food Res. Inst., Colney Lane, Norwich, Norfolk, UK]

Rhode Island Red × Light Sussex hens, bred for sensitivity to depression of trimethylamine oxidation when fed rapeseed meal, were used in a study on effects of a high-glucosinolate rapeseed (*Brassica napus*) meal and its fractions on trimethylamine oxidation in-vivo, and in-vitro using hen liver microsomes. Tables and graphs of results are given showing the composition of rapeseed meal fractions and their effects on trimethylamine oxidation. The results are discussed in detail; it is concluded that rapeseed tannins cause an appreciable depression of trimethylamine oxidation, due to inhibition of trimethylamine oxidase. The significance of this effect in relation to 'fishy' taint in eggs laid by hens fed rapeseed meal is discussed. AJDW

## 66

[The unknown egg: a survey on the image of eggs.]

Thouvenot, C.

*Cahiers de Nutrition et de Dietetique* 16 (4) 259-266 (1981) [7 ref. Fr, en] [CNRS, Cent. d'Analyse des Milieux Alimentaires 30, Rue Lionnois, 54000 Nancy, France]

Results of 2 surveys carried out in N.E. and S.W. France, covering a total of 250 families, on consumption of and attitudes to eggs are reported. Consumers were reasonably well informed about nutritional properties of eggs, but had exaggerated ideas about health risks associated with egg consumption: 67.5% of respondents believed that there were significant health risks attached to egg consumption, and 43% believed that eggs were associated with liver disease. Nostalgia for the production of eggs 'on the farm' was evident from responses to questions about place of purchase of eggs. DIH

67

[*Salmonella* and *Staphylococcus aureus*]contamination in liquid whole eggs.]  
Suzuki, A.; Kawanishi, T.; Konuma, H.; Takayama, S.; Imai, C.; Saitoh, J.*Journal of the Food Hygienic Society of Japan*  
[*Shokuhin Eiseigaku Zasshi*] 22 (3) 223-232 (1981)  
[25 ref. Ja, en] [Nat. Inst. Hygiene Sci., Kamiyoga 1-chome, Setagaya-ku, Tokyo, Japan]Liquid whole egg from 4 egg processing plants was bacteriologically examined. Neither *Salmonella* nor *Staph. aureus* was detected, in samples from 1 plant; for the others, the incidence of contamination with *Salmonella* was 11-84%, and that of *Staph. aureus* was 31-72%. The total bacterial count and coliform count were related to incidence of *Salmonella*. TM

68

## Egg fluffer.

Botts, W. M.

*United States Patent* 4 284 361 (1981) [En]

An egg fluffer has mixer blades with copper surfaces which interact with egg white albumen during whipping to give high-vol. stable foams. AS

69

## [Amino acid composition of egg contents in relation to protein and energy levels in the hen diet.]

Aminosäurenzusammensetzung der Eiinhalte von Legehennen in Abhängigkeit unterschiedlicher Protein- und Energieversorgung.

Kirchgessner, M.; Steinhart, H.

*Archiv für Geflügelkunde* 45 (4) 179-185 (1981) [9 ref. De, en, fr, ru] [Inst. für Ernährungsphysiol., Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]Groups of HNL laying hens were used in a study on effects of daily protein intake (14.0, 17.5, 21.0 or 24.5 g/bird) and daily energy intake (920, 1088, 1255 or 1422 kJ metabolizable energy/bird) on amino acid composition of the egg albumen + yolk, eggs being analysed after 11 or 31 days on the experimental diet. Tables of results are given. In general, amino acid concn. increased with increasing energy intake up to 1255 kJ/bird; they decreased if part of the dietary protein was needed as an energy source. Effects of energy intake were greater than those of protein intake; significant energy intake  $\times$  protein intake effects were observed for concn. of most amino acids. AJDW

70

## [Effects of organic acids in the diet on the performance of broilers and laying hens.] Der Einfluss organischer Säuren auf die Leistungen von Broilern und Legehennen.

Vogt, H.; Matthes, S.; Harnisch, S.

*Archiv für Geflügelkunde* 45 (5) 221-232 (1981)

[14 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Bundesforschungsanstalt für Landwirtschaft

Braunschweig-Völkenrode, Celle, Federal Republic of Germany]

This paper includes data for egg quality of hens fed diets containing 0, 0.5, 1.0 or 2.0% fumaric acid or propionic acid. Shell thickness, yolk index, albumen index and reflectance value (514 nm) are considered. 0 or 0.5% fumaric acid gave higher yolk index values than the 2 higher levels. 0.5% fumaric acid gave higher albumen index than 2% fumaric acid; and 1.0% fumaric acid gave higher reflectance values than 0 or 0.5% fumaric acid. 0 or 0.5% propionic acid gave thicker egg shells but lower reflectance values than 1 or 2% propionic acid. 1% propionic acid gave lower yolk indexes than the 0, 0.5 or 2.0% levels; the propionic acid-free diet gave a higher albumen index than the propionic acid-containing diets. AJDW

71

## [Effects of egg age and pasteurization on the quality of liquid whole eggs.] Der Einfluss des Eialters und des Pasteurisierens auf die Qualität von Vollei.

Scholtysssek, S.; Seemann, G.; Philipp, W.; El-Bogdady, A.

*Archiv für Geflügelkunde* 45 (5) 201-205 (1981) [7 ref. De, en, fr, ru] [Inst. für Tierhaltung & Tierzüchtung, Univ. Hohenheim, Federal Republic of Germany]Studies were conducted on effects of egg age (stored under industrial conditions for 2, 16 or 30 days) and pasteurization on the quality of liquid whole egg. Quality characteristics studied included pH, proximate composition, amino acid composition, protein types, viscosity, bacteriological quality and organoleptic properties. pH and DM content increased with egg age; no effect of pasteurization on pH or proximate composition was observed. Effects of egg age and pasteurization on amino acid composition were small. Concn. of albumin + conalbumin and of lipovitellenin + phosvitin increased whereas those of other protein fractions decreased during storage; concn. of the above 2 fractions and globulin increased whereas those of lysozyme + ovomucin and lipovitellin decreased as a result of pasteurization. Viscosity decreased during storage; pasteurization had little effect. Pasteurization reduced bacterial count, by a factor of  $10^3$ . Changes in taste and aroma occurred during storage of the eggs; organoleptic properties of pasteurized egg were preferred to those of non-pasteurized liquid egg. AJDW

72

## Distribution and conveyor apparatus for eggs.

Kattenbroek, H. J. van (Moba Holding Barneveld BV)

*United States Patent* 4 276 977 (1981) [En]

A distribution and conveyor apparatus for eggs has a smooth horizontally moving supporting surface and baffles which divide the width of the surface into a number of channels. A flat transverse member mounted before the baffles is preferably shaped such that the resistance to the passing over of the eggs in the centre of the supporting surface is stronger than at the edges. AS

73

**Automatic egg cooker.**

Joannou, C. J.

**United States Patent 4 276 820 (1981) [En]**

An automatic egg cooker is described in which one of the eggs to be cooked is continuously tested for consistency by being placed in an oscillatory system; the oscillations are measured, and an alarm is set to ring when the desired consistency of the egg is reached. AS

74

**Egg cooking in a microwave oven.**

Levinson, M. L.

**United States Patent 4 280 032 (1981) [En]**

A microwave-reflective 1st container limits microwave exposure to the top of a shelled, raw egg contained in it and is covered by a microwave-permeable lid; the 1st container is positioned in a microwave-permeable 2nd container so that the bottom and lower sides of the 1st container contact microwave-lossy liquid contained in the 2nd container. Temp. monitoring, a spoon shaped 1st container bottom, rotation restriction of the 1st container, and methods of using the apparatus to soft and hard cook raw, shelled eggs from both their prefrozen and room temp. states, are also described. AS

75

**[Energy conservation in frozen food storage.]**

Fritzs, K. H.

**Hütöipar 28 (3) 69-74 (1981) [Hu, en, ru]**

[Forschungsinst. für die Kühl- & Gefrierwirtschaft, Zwickau, Hildegottesschachtstrasse 3/b, German Democratic Republic]

In the case of most frozen food products (most fruits and vegetables) the electricity can be switched off during peak periods, provided the heat exchangers are powerful enough to extract the full daily heat load during off-peak periods. During the 'switch-off' periods, door openings and product movements should be kept to a minimum. Measurements in cold stores showed that after a 9-h 'switch-off' period, the average store temp. had increased only by K. In the storage of certain food products (e.g. onions, eggs) where RH has a strong effect on quality, this off-peak switch-off is not always possible because the air coolers cannot provide a stable climate in the stores. ESK

76

**[Studies in the field of food refrigeration technology.]**

Alyamovskii, I. G.; Golovkin, N. A.; Chizhov, G. B.

**Kholodil'naya Tekhnika No. 5, 53-58 (1981) [Ru]****[Leningradskii Tekh. Inst. Kholodil'noi****Promyshlennosti, Leningrad, USSR]**

A survey is presented of major studies carried out in the Department of General & Refrigeration

Technology of the authors institute during the last 50 yr, with particular attention to problems of fruit juice concn. by freezing, refrigeration of liquid whole egg, and chilling and refrigeration of meat. STI

77

**[Egg box.]**

ONO

**French Patent Application 2 440 891 (1980) [Fr]**

A modified egg-box of the type described in the main patent [see FSTA (1980) 12 11F443] has a horizontal tear strip on 1 of its lateral wings to provide access to the eggs. W&Co

78

**[Quantitative determination of perchlorethylene in feeds and eggs by gas chromatographic headspace analysis.]** Quantitative Bestimmung von Perchlorethylen in Futtermitteln und Eiern mittels der gaschromatographischen Headspace Analyse.

Kolb, B.; Auer, M.

**Lebensmittelchemie und Gerichtliche Chemie 35 (5) 92-94 (1981) [4 ref. De]** [Bodenseewerk Perkin-Elmer & Co. GmbH, Postfach 1120, 7770 Überlingen-Bodensee, Federal Republic of Germany]

A procedure for detn. of perchlorethylene residues in feeds and in eggs is described, based on headspace analysis by gas chromatography on a quartz capillary column, with electron capture detection. Analysis of liquid samples, e.g. egg yolk, is straightforward; a perchlorethylene-free sample is needed for preparation of an external standard. Most of the perchlorethylene present in eggs is in the yolk; levels in the albumen are negligible. Accuracy of estimation of perchlorethylene in egg yolk, expressed as coeff. of variation, is  $\pm 3.8\%$ . The method is rapid, and is suitable for automatic serial analyses. AJDW

79

**Apparatus for automatically loading eggs directly from stacks of egg-filled flats.**

Kuhl, H. Y.; Kuhl, P. R. (Kuhl Corp.)

**United States Patent 4 302 142 (1981) [En]**

Apparatus and method are described for automatically loading eggs directly from stacks of alternately rotating oriented flats. Apparatus includes a conveyor for supplying stacks of eggs to an egg loading station which includes a device for removing the eggs from the uppermost flat and then for removing the uppermost (now empty) flat. A device rotates and lifts the stack after the flat is removed to orientate the stack for removal of the next layer of eggs. AS

80

**Shell egg quality in Brazilian retail markets.**

Gardner, F. A.; Campos, E.J.

**Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais 33 (2) 305-311 (1981) [4 ref. En, pt]** [Texas Agric. Exp. Sta., College Station, Texas 77843, USA]

Comparative studies were conducted on quality (Haugh Unit score, albumen index and yolk index) of eggs from (i) producers, (ii) supermarkets and (iii) street markets in Belo Horizonte, Brazil. The eggs were tested after acquisition, and after holding for 3, 7 or 14 days at room temp. (25°C) or at approx. 7°C. Tables of results are given. Initial quality was highest for (i) eggs, slightly lower for (ii) eggs and appreciably lower for (iii) eggs. The inferior quality of (iii) relative to (i) and (ii) persisted throughout storage. Only slight reductions in quality of the 3 batches of eggs were observed during storage at 7°C; considerable deterioration was observed during storage at 25°C. AJDW

**81**

[Effects of strain, energy level in the diet and storage on egg quality and yolk cholesterol concentration.]

Campos, E. J.; Ferreira, M. O. O.

*Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais* 33 (2) 313-319 (1981) [26 ref. Pt, en] [Escola de Vet., Univ. Fed. de Minas Gerais, Belo Horizonte, Brazil]

Studies were conducted using 4 commercial layer strains (Shaver S tarcross, Dekalb, Hy-line and G-307) and 2 dietary energy levels (2850 and 3000 kcal metabolizable energy/kg). Effects of storage for 0, 3, 7 or 14 days at 23°C were also evaluated. Data are presented for Haugh unit scores, and for cholesterol concn. in the egg yolk. Haugh unit score deteriorated during storage, and was highest for Hy-line and lowest for Dekalb layers. Cholesterol concn. were significantly higher in eggs stored for 3 days than in those stored for 0, 7 or 14 days. G-307 eggs tended to have the highest and Dekalb and Shaver Starcross the lowest yolk cholesterol concn. Dietary energy level did not significantly influence either Haugh unit score or yolk cholesterol concn. AJDW

**82**

Factors affecting the nutritional requirements of laying hens.

Costa, P. T. C.

*Dissertation Abstracts International*, B 42 (5) 1682: Order no. 8124418, 118pp. (1981) [En] [Univ. of Florida, Gainesville, Florida 32601, USA]

Experiments were conducted in which diets with different nutrient-densities were fed to groups of laying hens of different strains and ages throughout distinct periods of the yr., subdivided according to hen wt. Data on hen performance and egg production, wt., mass and sp. gr. were collected. Egg sp. gr. was not influenced by body size or diet density but was significantly affected by periods, showing that egg shell quality deteriorated as the hen aged. AL

**83**

[The effect of feed on the content of thiamin and riboflavin in hens eggs.]

Sebesic, B.; Momirovic-Culjat, J.; Balint, L.

*Hrana i Ishrana* 22 (1/2) 37-40 (1981) [49 ref. Sh, en] [Farmaceutsko-Biokemijski Fak., Zavod za Kemiju Prehrane, Zagreb, Yugoslavia]

Comparative studies were conducted on thiamin contents in the yolk and riboflavin contents in yolk and albumen in eggs from (i) 7 industrial-type poultry farms and (ii) 6 smallholdings. Mean values and ranges for (i) and (ii) resp. were ( $\mu$ g%): thiamin in yolk 336.7 (231.1-388.0) and 822.3 (730.5-872.7); riboflavin in yolk 673.0 (361.8-955.3) and 336.2 (266.7-437.4); and riboflavin in albumen 774.3 (502.0-937.1) and 373.5 (329.5-397.7).

AJDW

**84**

[*Streptomyces* in liquid pasteurized egg.]

Comi, G.; Cantoni, C.

*Annali di Microbiologia ed Enzimologia* 30, 119-124 (1980) [14 ref. It, en] [Istituto di Ispezione degli Alimenti di Origine Anim., Univ. di Milano, Milan, Italy]

Studies were conducted on occurrence of *Streptomyces* spp. in liquid egg pasteurized at 64.5°C for 3 min. 24 strains were isolated; these were identified as *Str. sampsonii*, *Str. cellulosae*, *Str. microflavus*, and *Str. willmorei*. Temp. resistance of these species is discussed, together with their growth on egg cuticle or shell membrane. AJDW

**85**

Aseptic packaging promises new role for pasteurized liquid eggs.

Jacobs, L. C.

*Food Product Development* 15 (4) 38-40, 64 (1981)

[En]

A 2-step technique whereby liquid eggs are pasteurized then aseptically packaged without changing the functionality of the eggs is being investigated. When perfected this would offer a less expensive, more convenient alternative to conventionally frozen eggs used by many food processors and manufacturers. The method involves breaking whole eggs and pasteurizing them, either whole or separated into white and yolks, at temp. of 146-148°F for 30-90 s. The intention is to destroy the bacteria without destroying the eggs' functional properties. The idea is to put the processed eggs into cans, but not to freeze them, just hold them under refrigeration. VJG

**86**

[Studies on laying hens, covering heritabilities and correlations of laying performances, laying maturity, body weight and egg quality. II. Phenotypic and genetic correlations.] Untersuchungen an Legehennen über genetische Fundierung und Beziehungen von Legeleistung, Legereife, Körpergewicht und Kriterien der Eibeschaffenheit. II. Phänotypische und genetische Beziehungen.

Tawfik, E. S.; Horst, P.; Petersen, J.

*Archiv für Geflügelkunde* 45 (4) 166-175 (1981) [69 ref. De, en, fr, ru] [Inst. für Tierproduktion, Tech. Univ., Berlin]

Data from 26 268 eggs laid by 3170 hens were used in a study on genetic and phenotypic correlations among a wide range of egg characteristics, including egg wt., egg number, % albumen, % yolk, % shell, albumen height, yolk height, and albumen pH. The relationship of egg quality traits to general performance characteristics is also considered. [See *Archiv für Geflügelkunde* (1976) 40, 181-187 for part I.] AJDW

## 87

**The influence of dietary selenium on tissue and egg selenium levels in growing and laying chickens.** (In 'Mineral elements '80. Proceedings Part II' [See FSTA (1982) 14 7A535].) [Lecture]

Moksnes, K.; Norheim, G.

pp. 415-422 (1981) [10 ref. En] [Nat. Vet. Inst., PO Box 8156 Dep., Oslo 1, Norway]

In 1 part of this study 1-day old Norwegian-bred broilers were divided into 3 groups of 26 birds each and 5/group were killed and analysed initially, the remainder being fed a basal diet + 0.0, 0.1 and 1.0 p.p.m. Se as Na<sub>2</sub>SeO<sub>3</sub>, for 2, 4 or 6 wk. In the 2nd part, 20-wk old Norwegian-bred White Leghorn chickens (3 groups of 16) were killed initially (3/group), or fed a basal diet + 0.0, 0.1 and 1.0 p.p.m. Se as Na<sub>2</sub>SeO<sub>3</sub> for 18 or 31 wk; every 4th wk 10 eggs/group were analysed. In both studies breast and liver samples were stored at -20°C up to analysis, and tissue and egg samples were analysed by a modified fluorometric technique. Results are presented in graphs. Increased dietary levels of Se led to higher Se concn. in eggs and tissues, most significantly so with 1.0 p.p.m. supplemental Se, and especially in eggs and liver. LH

## 88

**Using Zeta potential to optimize coagulating aid doses used to treat food processing wastes.**

Welsh, F. W.; Zall, R. R.

*Process Biochemistry* 16 (4) 31-33, 42 (1981) [13 ref. En] [Dep. of Food Sci., Cornell Univ., Ithaca, New York 14853, USA]

Experiments were conducted to determine the efficacy of using zeta potential as a monitoring tool for coagulant treatment of liquid waste from fruit juice processing, scallop shucking, and egg breaking. Jar test results were compared to zeta potential analysis for these 3 wastes which were also analysed for total kjeldahl protein, TS, ash, suspendible solids and COD before and after treatment with optimum concn. of a new fish scale coagulant. Results showed that excellent treatment conditions may be achieved with coagulants when the zeta potential achieved by optimum coagulant addition is not in the range of +3 to -10 mV. Zeta potential may be used as a monitoring device for coagulation processes used to treat certain food processing waste effluents. Especially those with large concn. of colloidal material. SP

## 89

**[Boiled egg product.]**

Nagoya Shokuran Kako KK.

*Japanese Examined Patent* 5 644 688 (1981) []a]

Process is described for preparing packaged, boiled, shelled eggs in 2 plastic bags containing aqueous preservative solutions. Deterioration is prevented by adding the antioxidant to the solution in the outer bag but not to the solution in the inner bag. RAW

## 90

**Reaction of egg extracts with 3,3',5,5' tetramethyl benzidine - a possible method for evaluating the storage history of chicken shell eggs.**

Monsey, J. B.; Jones, J. M.

*Journal of Food Technology* 16 (6) 701-703 (1981) [1 ref. En] [Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

A chemical test is described that gives results that are apparently related to the storage history of eggs, although the nature of the reaction is unknown. If whole egg containing no blood spots is reacted with the reagent used in estimation of blood, 3,3',5,5'-tetramethylbenzidine (TMB) in the presence of Cu<sup>2+</sup>, the absorbance at 370 nm measured 55 min after addition of acetic acid to the reaction mixture is apparently related to egg storage time-temper. history. This relationship is demonstrated graphically for eggs stored for 4 wk at 10°, 20°, 25° and 37.2°C. DIH

## 91

**Quality of eggs. Proceedings of the First European Symposium held at Hotel De Keizerskroon, Apeldoorn, 18-23 May 1981. [Conference proceedings]**

Beuving, G.; Scheele, C. W.; Simons, P. C. M. (World Poultry Science Association, European Federation; Netherlands, Spelderholt Institute for Poultry Research) (Editors)

vii + 278pp. ISBN 90-9000196-4 (1981) [many ref. En] 7361 DA Beekbergen, Netherlands; Spelderholt Institute for Poultry Research

The full text is given of papers presented at this First European Symposium on Egg Quality, including the following. Effects of process conditions during concentration and drying on the quality of liquid foods, by H. A. C. Thijssen (pp. 5-6). Changes in proteins and amino acids of vitelline membrane, by T. Smolinska & T. Trziszka (pp. 111-115, 20 ref.). Assessing the influence of cage and equipment design on egg shell quality - a commercial perspective, by S. M. Shane (pp. 119-126, 15 ref.). Egg shell damage as affected by cage shape, by D. Bell, L. Yates & C. Adams (pp. 127-132, 3 ref.). Nutritional factors & egg shell strength, by C. G. Belyavin & K. N. Boorman (pp. 165-175, many ref.). Effects of dietary 25-(OH)D<sub>3</sub> and *Solanum malacoxylon* on shell quality of brown eggs, by B. Sauveur (pp. 194-202, 22 ref.). A comparison of thick and thin eggshell lines of chickens for net absorption of Ca, by E. G. Buss & R. B. Guyer (pp. 239-249, 43 ref.). The genetic disposition of the protein pattern in egg white, by A. El-Bogady (pp. 258-263, 8 ref.). Environmental and genetic factors influencing the laying of sparsely calcified and shell-less eggs, by W. F. van Tijen (pp. 264-270, 12 ref.). Formation of lines differing in egg shell quality traits to investigate their relevance for frequency of broken eggs, by W. Hartmann, G. Heil & H.-W. Rauch (pp. 271-278, 19 ref.). A further 25 papers are abstracted separately in FSTA, and are listed in the author index under World Poultry Science Association, European Federation [Egg Quality Symposium]. AJDW

## 92

## Method for peeling shell from boiled eggs.

Fujii, N. (QP Corp.)

United States Patent 4 308 290 (1981) [En]

Boiled eggs are shelled in water flowing through a cylinder. The eggs collide against the cylinder inner surface, to fragment the eggshells without breaking the shell membrane and then a whirling water stream is applied to break the membrane. Boiled eggs are then smoothly separated from their shells. AS

## 93

Effects of a living nonfreeze-dried *Lactobacillus acidophilus* culture on performance, egg quality, and gut microflora in commercial layers.

Miles, R. D.; Arafa, A. S.; Harms, R. H.; Carlson, C. W.; Reid, B. L.; Crawford, J. S.

Poultry Science 60 (5) 993-1004 (1981) [24 ref. En]

[Poultry Sci. Dep., Univ. of Florida, Gainesville, Florida 32611, USA]

Effects of addition of the *Lactobacillus acidophilus* culture Probios to the diet of laying hens of 2 breeds (Hy-Line, Shaver Starcross) at 3 locations in the USA on performance, egg quality, egg wt. and gut microflora were studied. 3 levels of addition of Probios to the culture were tested (0.0125, 0.0375 or 0.0625%). The culture was fed for  $\leq 280$  days. Tables of data are given, including data for egg sp. gr., Haugh unit score, and yolk colour. No significant differences in egg quality or egg wt. attributable to feeding Probios were observed.

AJDW

## 94

## TI 59 calculator program for Haugh unit calculation.

Roush, W. B.

Poultry Science 60 (5) 1086-1088 (1981) [3 ref. En]

[Dep. of Poultry Sci., Pennsylvania State Univ., Univ. Park, Pennsylvania 16802, USA]

A TI 59 calculator programme was written for Haugh unit score detn. of the albumen quality of eggs. The original equation developed by Haugh [US Egg Poultry Magazine (1937) 43, 552-555, 572-573] was incorporated into the programme. Use of the calculator programme gives an accurate and direct reading of the Haugh unit score. The programme was written so that the data could be recorded by means of an optional printer. AS

## 95

## Trimethylamine taint in eggs. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Fenwick, G. R.; Pearson, A. W.; Butler, E. J.

pp. 144-152 (1981) [27 ref. En] [ARC Food Res. Inst., Colney Lane, Norwich, UK]

Studies on problems with a 'fishy' taint in eggs laid by brown egg-laying hens fed rapeseed meal or Icelandic capelin meal are described. Aspects considered include: effects of the rapeseed goitrogen 5-vinyloxazolidine-2-thione; effects of other thionamides; effects of thyroid hormones; effects of duration of administration of the above goitrogens; effects of rapeseed tannins; and effects of capelin meal. Trimethylamine oxidase activity in the plasma of the hens, and intensity of taint in the eggs were determined. Dietary 5-vinyloxazolidine-2-

thione or other thionamides depressed trimethylamine oxidase activity; this response was rapid ( $> 50\%$  inhibition within 1 h). Thyroid hormones failed to prevent this effect. Rapeseed tannins also inhibited trimethylamine oxidation. Dietary capelin meal resulted in a fishy taint in eggs laid by some hens. The results are discussed in relation to inhibition of trimethylamine oxidase by rapeseed constituents. AJDW

## 96

## Increasing calcium contents in rations of laying hens with a high laying rate. (In 'Quality of eggs.'

Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Vogt, H.

pp. 176-185 (1981) [36 ref. En] [Inst. of Poultry &amp; Small Animals, D-3100 Celle, Federal Republic of Germany]

Studies on the effects of Ca content of the diet and hen age on shell quality and internal quality of eggs are described. Data are presented for % incidence of shell faults, shell deformation value, breaking strength, shell thickness and albumen index, yolk index, and yolk colour of eggs laid by hens receiving a range of dietary Ca levels. The results show that shell quality deteriorates with hen age; shell thickness tends to increase with increasing dietary Ca level, but this is limited, and cannot fully compensate for the deterioration due to age. Deterioration as a result of age is probably due to reduction in strength of the shell material, rather than merely reduced shell thickness. Dietary Ca level did not consistently affect interior egg quality, although yolk colour data suggest that carotenoid uptake may be adversely affected by high dietary Ca levels. AJDW

## 97

## Effect of dietary distillers feeds on albumen quality of brown shelled eggs. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Sauveur, B.

pp. 186-193 (1981) [10 ref. En] [Sta. de Recherches Avicoles, INRA, Nouzilly, 37380 Monnaie, France]

3 feeding trials were conducted with 4 commercial strains of hens (3 producing brown and 1 producing white-shelled eggs) receiving (i) a control diet, (ii), (iii) and (iv) a diet with 10%, 15% or 20% distillers' dried grains with solubles, resp., or (v) 20% brewers' dried grains, and (vi) as (i), with addition of 10 p.p.m. Cr and 1000 p.p.m. Zn. Data are presented for egg wt., breaking strength and Haugh scores of fresh and stored eggs. The results on egg quality were very variable; use of distillers' dried grains with solubles sometimes improved Haugh scores. It is concluded that use of 10-15% distillers' dried grains with solubles in the diet of hens laying brown-shelled eggs should present no problem, and that interior quality may in some cases be improved. AJDW

## 98

**Quality of eggs in relation to the nutrition of laying hens.** (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Scheele, C. W.; Versteegh, H. A. J.  
pp. 203-212 (1981) [18 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Bekerbergen, Netherlands]

1008 Shaver 288 laying hens (24 wk of age at the start of the study) were used in a 12-wk feeding trial conducted to evaluate effects of 2 feeding levels (ad lib. and 88% of ad lib.), 3 digestible fat levels, 2 available lysine levels and 2 metabolizable energy levels on egg quality. Data are presented for egg wt., % protein, % fat, % shell and wt. of shell. Egg wt. increased with increasing energy and lysine level in the diet; fat level had little effect. Feed restriction reduced egg wt. High energy and lysine levels in the diet increased protein content and reduced fat content in the eggs. Shell thickness and shell % decreased with increasing dietary lysine and energy levels. Quantity of shell produced by the hens was practically independent of shell wt. The shell wt. and % tended to decrease with increasing dietary fat level. AJDW

## 99

**Contents of dry matter, protein and fat in eggs as influenced by diet, strain and age of the hen.** (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Elwinger, K.; Andersson, K.; Pamlenyi, I.  
pp. 213-219 (1981) [10 ref. En]

4 studies were conducted to evaluate effects of strain (LSL, Shaver Starcross 288, Hisex), dietary protein content (13, 15 or 17%), dietary metabolizable energy level (10.7, 11.2, 11.7 or 12.2 MJ/kg), feeding (ad lib. vs. restricted) and hen age (2 successive 364-day laying periods) on the DM, fat and protein contents of eggs. Tables of results are given, including data for egg wt., and the DM, fat and protein ( $N \times 6.25$ ) contents of liquid whole egg, yolk and albumen. DM content in liquid egg increased with increasing age, and was higher for ad lib.-fed than restricted-fed hens. Neither dietary protein nor energy levels significantly affected DM concn. In 2 experiments, eggs laid by LSL hens had lower DM concn. than those laid by the other breeds. Protein concn. in eggs increased slightly but significantly with increasing dietary protein concn. Dietary energy level significantly influenced protein content of the eggs in only 1 of the 4 experiments. Shaver hens laid eggs with higher protein contents than the other breeds. Protein content of whole egg and albumen decreased with increasing hen age. Fat content of yolk was relatively constant, but was somewhat higher in ad lib. than restricted-fed hens. Fat content tended to be higher in eggs laid by LSL than by Shaver hens. Fat content increased with increasing age of the hen. AJDW

## 100

**Variations in egg quality in connection with yields in production.** (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Bougon, M.; Lahellec, C.; Protais, J.  
pp. 223-225 (1981) [En] [Sta. Exp. d'Agric., Ploufragan, France]

Studies were conducted on the relation of egg quality to hen productivity; eggs laid by selected groups of hens of high, average and low egg yield were compared. Aspects covered include shell colour and deformation value, and the wt., height, pH, Haugh unit score, DM content and foam characteristics (foam sp. wt., foam stability) of the albumen. Tables of results are given. Shell deformability increases and colour intensity decreases with increasing egg yield of the hen. Albumen quality is highest for the highest productivity group: Haugh scores and DM concn. are highest for this group, pH are lowest. Foaming characteristics of the albumen differ little between the productivity groups. AJDW

## 101

**Influence of lighting program on egg quality.** (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Bougon, M.; Lahellec, C.; Protais, J.  
pp. 226-230 (1981) [3 ref. En] [Sta. Exp. d'Agric., Ploufragan, France]

1344 Warren Sex Sal Link pullets, 20 wk of age at the start of the trial, were subjected to a 14 h light/10 h dark cycle up to 49 wk of age. Half were then (i) continued on this lighting cycle up to 65 wk of age, whereas the others were (ii) transferred to an alternating 3 h light/3 h dark cycle. Egg quality (grade, wt. and % albumen, yolk and shell, % cracks and deformation value of the shell, and Haugh unit score, pH, DM content, foam sp. gr. and foam stability of the albumen) were then determined for (i) and (ii) eggs. (ii) was found to increase egg wt., decrease % cracked eggs, and increase proportion of yolk in the egg. DM % in the albumen was increased by (ii), but little effect on the other albumen quality attributes was observed. AJDW

## 102

**Quality of eggs laid by hens kept on free range and in cages.** (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Pavlovski, Z.; Basic, B.; Apostolov, N.  
pp. 231-235 (1981) [9 ref. En] [Res. Inst. of Anim. Husbandry, Zemun-Polje, Belgrade, Yugoslavia]

Comparative studies were conducted on the quality of eggs laid by Prelux-R hens under (i) free range or (ii) battery cage conditions. Data are presented for external and internal quality characteristics of the eggs. Shape index, albumen height, Haugh unit score, yolk colour score, shell thickness and quality grades were better for (i) than for (ii); shell deformation, yolk % and incidence of meat spots was greater for (ii) than for (i). AJDW

## 103

Egg quality as related to the hen age and selection for production traits. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Ambrosen, T.

pp. 250-257 (1981) [3 ref. En] [Dep. of Poultry & Rabbits, Nat. Inst. of Anim. Sci., Rolighedsvej 25,

1958 Copenhagen V, Denmark]

Comparative studies were conducted on egg quality of hens of 3 lines (i) selected for high egg wt., (ii) selected for high egg numbers and (iii) an unselected control line, over the hen age range 26-61 wk. Data are presented for egg, shell, albumen and yolk wt., solids, protein, lipid, phospholipid and cholesterol concn. in the yolk, and solids and protein content and amino acid compositions of the albumen. Regressions and phenotypic correlations are also given. (i) had significantly higher egg wt., albumen wt., yolk wt., shell wt. and solids concn. in yolk, and lower concn. of phospholipids in yolk and protein in albumen solids than (iii). (ii) had lower shell wt., protein and cholesterol concn. in yolk, and protein and solids in albumen, and higher solids concn. in yolk than (iii). In all 3 lines, % protein in yolk increased and lipid and cholesterol concn. in yolk, and protein and solids concn. in albumen decreased with increasing age. AJDW

## 104

Changes in egg shell strength up to 21 days after oviposition. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Hamilton, R. M. G.; Grunder, A. A.; Thompson, B. K.; Hollands, K. G.

pp. 104-110 (1981) [16 ref. En] [Anim. Res. Inst., Agric. Canada, Ottawa, Ontario, Canada K1A 0C6]

Two studies were done to determine changes in sp. gr. (SG), non-destructive deformation (DFM) and quasi-static compression fracture strength (CFS) of eggs from White Leghorn hens. In the first study measurements at 3 min and 3 h indicated that there were no differences in SG but CFS increased ( $P < 0.01$ ) and DFM tended to decrease ( $P > 0.05$ ). Much of the increase in CFS could be explained by a decrease in temp. of the egg. In 2 experiments of the second study, which also included, impact fracture strength (IFS) of eggs, measurements were obtained between 1 and 15 days after oviposition. CFS, SG and egg wt. in water

decreased ( $P < 0.01$ ) with time while IFS increased ( $P < 0.01$ ). DFM, however, decreased in one experiment and increased in the other. The changes in IFS and CFS of the eggs indicated that material and structural properties of the shell were influenced by the length of storage. The results of a third experiment indicated that the decrease in SG to 21 days after oviposition was due to a loss in wt. because egg wt. changed at the same rate in air as water. AS

## 105

The influence of the age of chicken eggs and of pasteurization on the quality and shelf life of liquid whole eggs. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Scholtyssek, S.

pp. 48-51 (1981) [En] [Univ. Hohenheim, Lehrstuhl Kleintierzucht, Stuttgart-Hohenheim, Federal Republic of Germany]

A total of 90 000 eggs was used in a study on effects of age of the eggs (2, 16 or 30 days) and pasteurization on the quality of liquid whole egg prepared therefrom. Albumen height and yolk index decreased and air cell size increased with increasing age of the eggs. pH and DM content of the liquid egg increased with increasing age of the shell eggs; protein, fat, ash, and amino acid concn. were not significantly influenced by age.

Viscosity (measured with a Haake Rotovisco instrument) decreased with age; organoleptic properties deteriorated slightly. No significant change in bacteriological quality was observed over the 30-day storage period. Pasteurization improved bacterial quality and organoleptic properties, but did not affect composition or viscosity characteristics. AJDW

## 106

The microbiology of liquid egg. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Morgan-Jones, S. C.; Martin, I. C.

pp. 35-40 (1981) [14 ref. En] [Dep. of Microbiol., Edinburgh School of Agric., West Mains Road, Edinburgh, UK.]

Studies were conducted on the microbiological quality of non-pasteurized liquid whole egg (120 samples), pasteurized whole egg (44 samples), unpasteurized egg whites (16 samples) and unpasteurized 11% salted egg yolk (26 samples). Tables of data are given showing % distribution of total viable counts, thermoduric counts, pseudomonad counts, yeast counts and *Salmonella* counts. Bacteriological quality of the raw whole egg was generally good; improved hygiene in egg production and handling would reduce contamination with salmonellae from the shell. *Salmonella* counts were low (8% of samples having counts of 1-10/ml, none having higher counts). Pseudomonads were present in greater numbers in raw than in pasteurized products, whereas thermoduric organisms predominated in the pasteurized samples. Levels of post-pasteurization contamination were low. Salting considerably reduced counts of pseudomonads. AJDW

## 107

The technique and economic benefits of washing grade "A" consumption eggs. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Kuhl, H. Y.

pp. 57-65 (1981) [En] [Kuhl International Corp., Flemington, New Jersey, USA]

Washing of eggs is discussed with reference to: EEC legislation; advantages of washing of eggs, with special reference to decreased wastage and better consumer acceptance; experience with continuous-type egg washers in the Netherlands, the Federal Republic of Germany, the UK, Denmark and Sweden; International Egg Commission recommendations; the lack of need for oiling and cooling of washed eggs; optimum time to wash eggs; costs; characteristics and operation of commercial egg washer/driers; and the lack of damage to shell or cuticle in modern egg washing systems. AJDW

## 108

Egg washing situation in Canada. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Randall, C. J.

pp. 66-71 (1981) [9 ref. En] [Agric. Canada, Ottawa, Canada]

The current egg washing situation in Canada is discussed, with special reference to the hygienic quality of the washed eggs. Data are presented from surveys on bacterial counts in wash water and on washed eggs. The results show that, although it is possible to maintain low bacterial counts in wash water, unacceptably high counts were recorded at many egg-washing plants (e.g. 68% of samples with counts  $> 10^7$ /ml in 1 survey). Microbial counts were found to increase through all stages at the egg grading station, from the unwashed egg to the washed, packaged egg. In some plants, eggs were packaged while still wet. Guidelines for efficient washing of eggs include: efficient cleaning of the equipment; removal of cracked or very dirty eggs; automatic dispensing of detergent/sanitizer into the wash water; prompt drying; and establishment of max. tolerances for bacterial loads on the shell of washed eggs. AJDW

## 109

An automatic egg candler. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Sherman, R. C.

pp. 77-83 (1981) [1 ref. En] [Battelle Columbus Lab., Columbus, Ohio, USA]

Problems with automatic candling systems are briefly discussed. A design is presented for a microprocessor-controlled 'intelligent' candler. White light is coarsely focused onto the egg. A lens on the other side of the egg images a small part of the egg surface onto 2 detectors by a beam splitter; before each detector is placed a narrow bandpass filter, one at 577 nm (blood absorption band) and 1 at 590 nm (no absorption by blood). The microprocessor monitors outputs of the 2 sensors and the ratio between them. The egg is rotated and simultaneously scanned so that its whole surface is covered. On the basis of information from the 2 detectors, the system can differentiate good from defective eggs, and detect dispersed blood, localized blood spots, discolored eggs, and cracks etc. Trials gave good results, although hairline cracks could not be detected. AJDW

## 110

Laser scanning system for the automated inspection of eggs for haircracks. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Bol, J.

pp. 84-93 (1981) [5 ref. En] [Battelle-Inst. eV, Frankfurt am Main, Federal Republic of Germany]

A device for detection of hairline cracks in eggs is described. The egg is scanned by a narrowly focused laser beam; light entering the egg through a crack is scattered, increasing the general brightness level of the egg, which is measured by a photodetector assembly; the photodetector display shows a sharp peak when the laser beam scans a crack. Practical problems are considered, with reference to selection of width vs. depth of focus of the laser beam, and effects of the thickness and colour of the egg shell (thin white shells giving a relatively small increase in brightness when a crack is scanned). Practical results showed that the apparatus could reliably detect cracks with widths  $> 50 \mu\text{m}$ , and detected narrower cracks with decreasing probability. Cracks  $< 20 \mu\text{m}$  wide were not detectable. AJDW

## 111

Electrooptical blood-spot detection in intact eggs. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Jong, L. P.

pp. 94-102 (1981) [10 ref. En] [Dep. of Electrical Eng., Delft Univ. of Tech., Delft, Netherlands]

A device for detection of blood spots in eggs is described, in which light transmittance at 2 wavelengths (577 nm, at which wavelength haemoglobin gives a high absorbance, and 598 nm, at which little or no absorbance by haemoglobin occurs), presence of blood spots being detected on the basis of the ratio between the 2 transmittance values. Aspects considered include spectral characteristics of intact eggs, the dynamic range of the signal intensity, inhomogeneity of egg structure, stray and background light, and electro-optical transfer stability. Design of an optical system for this application is discussed with the aid of a diagram. Practical trials on 180 eggs showed this system to give no false positives, while it missed 3 small blood spots of a total of 56. AJDW

## 112

The isolation of volatile sulphur compounds from cooked hens eggs using two novel trapping methods. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Flanders, A.; Beswick, G.; Rosie, D. A.

pp. 153-162 (1981) [9 ref. En] [Dep. of Applied Biol. &

Food Sci., Polytechnic of the South Bank, London SE1 0AA, UK]

Volatile S compounds from the headspace of boiled eggs were trapped by 2 methods: (i) simultaneous solvent extraction (using diethyl ether) and liquid N cold-trapping, and (ii) adsorption on a Tenax GC column. The isolates were then analysed by GLC with flame photometric detection in the S mode. Studies with model mixtures showed (ii) to give higher recoveries

than (i). 11 volatiles were isolated by (i),  $\text{H}_2\text{S}$ , methanethiol, ethanethiol, dimethyl sulphide and dimethyl disulphide being identified. 21 volatiles were isolated by (ii); the same 5 compounds as for (i) were identified. No apparent artefact formation was observed with (ii). AJDW

### 113

**The use of the ultrafiltration process in the egg products industry. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]**

Uijttenboogaart, T. G.  
pp. 24-34 (1981) [11 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Beekbergen, Netherlands]

Studies on concentration of whole egg and egg white by ultrafiltration are described. 3 ultrafiltration modules were used: a Rhone-Poulenc plate & frame module, an Abcor spiral-wound module and a Wafilin tubular module. Aspects considered include effects of process parameters on mean permeate flux; effects of fermentation of the egg products (to eliminate glucose) on permeate flux; permeate composition; quality of concentrated and dried egg products; and economics of the process. For egg white, permeate flux was highest at high product velocity, high temp. and high pressure; for whole egg, product velocity and temp. were the main factors influencing permeate flux, effects of pressure being small. Running time had little effect on permeate flux. Fermentation tended to reduce permeate flux; fermentation after concentration is therefore recommended. Permeate from egg white and whole egg contained 1.1 and 1.2% dry solids, resp. Functional properties differed little between dried egg products prepared with and without pre-concentration by ultrafiltration. The economics of the process are generally favourable for egg white; for whole egg, there is currently little cost advantage or disadvantage in use of ultrafiltration. AJDW

### 114

**Egg and egg product flavor. [Review]**

Maga, J. A.

*Journal of Agricultural and Food Chemistry* 30 (1) 9-14 (1982) [60 ref. En] [Dep. of Food Sci. & Nutr., Colorado State Univ., Fort Collins, Colorado 80523, USA]

Studies directly or indirectly concerning volatile compounds in eggs and egg products are reviewed. Volatiles present in whole eggs, yolks, whites, fermented eggs and dehydrated egg products are considered separately; formation of volatiles during heat treatment of eggs is discussed in most of these sections. Other aspects contributing to flavour and off-odour of eggs which are considered are feed effects, absorption of extraneous odours through egg shells and influence of storage and treatment of eggs for storage. In general it is concluded that no specific compounds have been identified that are responsible for characteristic egg flavour, and that objectionable flavours are usually related to components of hen feed (with some effect of breed). DIH

### 115

**Specification for the grading of eggs. Cyprus, Organization for Standards & Control of Quality**

*Cyprus Standard CYS 55:1980, 3pp. (1980) [En] [Min. of Commerce & Ind., Nicosia, Cyprus]*

The standard deals with the wt. grading of fresh eggs (fresh defined as eggs with air cell  $\leq 8$  mm) into large ( $\geq 70$  g), standard (55-70 g) and small ( $\leq 55$  g) sizes for retail sale, quality characteristics, labelling, sampling requirements and tolerances. AL

### 116

**Heterogeneity and properties of heat-stable ovalbumin from stored egg.**

Kurisaki, J.; Murata, Y.; Kaminogawa, S.; Yamauchi, K. *Journal of Agricultural and Food Chemistry* 30 (2) 349-353 (1982) [20 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan]

Changes in the properties of ovalbumin during storage were examined, especially with regard to the heat stability. 2 fractions of heat-stable ovalbumin were separated from the stored egg. One was a minor new protein which was slightly acidic compared with the fresh ovalbumin. Another major ovalbumin could not be distinguished in properties, except for the stability to heat denaturation, from native ovalbumin, since the major ovalbumin from the stored egg showed the same behaviour in electrophoresis and chromatography as did the fresh ovalbumin. These results show that the transformation of ovalbumin to the heat-stable form cannot be explained by the change in the net surface charge. AS

### 117

**Fracture force fluctuations due to aging of Japanese quail eggs.**

Place, T. A.; Eroschenko, V. P. *Poultry Science* 60 (4) 882-883 (1981) [13 ref. En] [Dep. of Mech. Eng., Univ. of Idaho, Moscow, Idaho 83843, USA]

Japanese quail eggs were stored in a refrigerator for periods ranging from 1 to 14 days after oviposition. The effect of this ageing on egg wt. loss and fracture force was measured. The eggs lost wt. at a rate of roughly 1%/wk. The fracture force increased to a max. after 4 days of storage, declined to a min. at day 11, and then rose again up to day 14. The force required to fracture the eggs was significantly higher at days 4 and 14 than at day 11. AS

### 118

**Localization of allergenic reactive sites on hen ovomucoid.**

Konishi, Y.; Kurisaki, J.; Kaminogawa, S.; Yamauchi, K. *Agricultural and Biological Chemistry* 46 (1) 305-307 (1982) [4 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan]

## 119

**The influence of layer flock age on egg component yields and solids content.**

Fletcher, D. L.; Britton, W. M.; Rahn, A. P.; Savage, S. I. *Poultry Science* 60 (5) 983-987 (1981) [19 ref. En] [Dep. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

Two experiments were conducted to determine the influence of layer flock age on egg component yields and solids content of the yolk and albumen. Experiment 1 was conducted on eggs collected during February from 6 commercial farms with the same strain (Shaver) of birds ranging in age from 26 to 58 wk and fed the same dietary energy and protein levels. The total and relative amounts of shell, yolk, and albumen were determined using two separation techniques and the total solids were determined for the yolk and albumen. Experiment 2 was conducted in August using 4 commercial flocks of Shaver hens ranging in age from 29 to 62 wk. The eggs were analyzed as in Experiment 1 using the separation technique that resulted in the lowest coeff. of variation. Results indicated that as layer flock age increases, egg wt dry shell wt deformation and % yolk increased, % shell, % albumen and % albumen solids decreased, and % yolk solids exhibited no consistent patterns. These differences would result in an approx. 2% increase in dry yolk solids by using eggs from older hens. AS

## 120

**[Process for preserving eggs after boiling and shelling, means for its application and products obtained.]**

Staron, T. J. (France, Institut National de la Recherche Agronomique)

*French Patent Application* 2 482 831 (1981) [Fr.]

Boiled and shelled eggs contact a solution, the acid concn. of which is such that it yields a pH of approx. 4-5.5 in the total wt. of the preserved egg white. This solution also contains  $\leq 1$  magnesium salt, which forms insoluble magnesium proteinates with the egg proteins. W&Co

## 121

**[Egg preservation.]**

Seisan Kaihatsu Kagaku

*Japanese Examined Patent* 5 646 767 (1981) [Ja]

Process is described in which hens' eggs are dried using  $O_2$ -free air obtained through the use of an electrochemical deoxygenation apparatus. IFT

## 122

**Rapid detection of *Salmonella* spp. in food by use of the ISO-GRID hydrophobic grid membrane filter.**

Entis, P.; Brodsky, M. H.; Sharpe, A. N.; Jarvis, G. A.

*Applied and Environmental Microbiology* 43 (2) 261-268 (1982) [22 ref. En] [QA Lab. Ltd., Toronto, Canada M9C 1C2]

A rapid hydrophobic grid-membrane filter (HGMF) method was developed and compared with the Health Protection Branch cultural method for the detection of *Salmonella* spp. in 798 spiked samples and 265 naturally

contaminated samples of food (including 200 samples of dried skim milk, 130 of raw poultry, 187 of raw ground neat, 117 of raw liver, 170 of dried foods including a var. of spices, chocolate products, cake mixes and miscellaneous low-moisture products, and 144 of liquid egg). With the HGMF method, *Salmonella* spp. were isolated from 618 of the spiked samples and 190 of the naturally contaminated samples. The conventional method recovered *Salmonella* spp. from 622 spiked samples and 204 unspiked samples. Isolation rates from *Salmonella*-positive samples for the 2 methods were not significantly different (94.6% overall for the HGMF method and 96.7% for the conventional approach), but the HGMF results were available 2-3 days after sample receipt vs. 3-4 days by the conventional method. AS

## 123

**[Study of some routes of ampicillin excretion in farm animals.]**

Chaleva, E.

*Veterinarnomeditsinski Nauki* 18 (3) 92-96 (1981)

[7 ref. Bg, ru, en] [Tsentralen Nauchnoissled. VetMed. Inst., Sofia, Bulgaria]

18 lactating ewes were divided into 3 groups of 6, which received (i) 25 mg ampicillin trihydrate/kg body wt. intramuscularly, (ii) 25 mg ampicillin sodium intramuscularly or (iii) 50 mg ampicillin trihydrate/kg body wt. orally after 10%  $CuSO_4$  solution had been applied to the buccal mucosa. Milk samples were taken at intervals for  $\leq 48$  h after treatment. Ampicillin was detected in milk of groups (i) and (ii) 30 min after administration, reached max. concn. of 0.39 and 0.75  $\mu$ g/ml resp. 4 h after administration, and persisted for 24 and 14 h, resp. In group (iii) milk, ampicillin content reached 0.1  $\mu$ g/ml in 2 ewes and was detectable for  $\leq 8$  h. 3 groups of laying hens received resp. ampicillin sodium in drinking water at 500 mg/l for 3 days, or ampicillin trihydrate by mouth at 20 or 60 mg/kg body wt. for 6 days. Ampicillin appeared in egg content only after administration of 60 mg/kg body wt., reaching max. concn. of 0.05  $\mu$ g/ml in the white and 0.03  $\mu$ g/ml in the yolk 4 days after administration and remaining detectable for up to 8 and 6 days, resp. SKK

## 124

**[Calorimetric measurement of food putrefaction.]**

Miyagawa, K.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (11) 569-572 (1980) [5 ref. Ja, en] [Nagasaki Women's Coll., 666 Yayoi-cho, Nagasaki-shi, Nagasaki-ken, Japan]

Rate of heat evolution during putrefaction at 30°C was measured using a twin conductive calorimeter. Heat evolution due to putrefaction of stirred whole egg and egg yolk occurred after 4 h, but was not observed within 20-24 h for non-stirred whole egg and stirred egg white. Rate of heat production from defrosted fish was greater than that from raw fish. A thermogram of milk putrefaction agreed well with the growth curve of putrefactive bacteria, and rate of heat evolution from inoculated bean curd (tofu) was proportional to the size of the inoculum, suggesting the usefulness of calorimetry in the study of putrefaction. [From En summ.] JRR

123

Effects of restricting feed but not nutrients on the laying performance of brown egg hens.

Gerry, R. W.; Muir, F. V.

*Feedstuffs* 54 (19) 24-25 (1982) [16 ref. En] [Dep. of Poultry Sci., Univ. of Maine, Orono, Maine, USA]

Trials were conducted using 2 strains of brown egg laying hens, receiving a 16% protein ration (i) full-fed or restricted to (ii) 97% or (iii) 94% of the full fed level, diets (ii) and (iii) being formulated to give nutrient levels equal to (i). Data are included for egg wt., Haugh unit score and shell thickness. There were no significant differences in these egg quality characteristics attributable to diet. AJDW

124

Relation between yolk cholesterol and some economic characters in chickens.

Kicka, M. A. M.; Osman, M. A.; Riad, S. A.; Kamar, G. A. R.

*Egyptian Journal of Animal Production* 19 (1) 115-119 (1979, publ. 1980) [18 ref. En] [Anim. Breeding Dep., Cairo Univ., Cairo, Egypt]

15 hens of each of the var. White Leghorn (WL), White Baladi (WB) and Fayoumi (FY) were floor reared from sexual maturity until the end of the study. After hens had been in production for 3 months, 4 eggs/hen were used to examine egg wt., yolk wt. and yolk cholesterol content. Hatchability of eggs was examined in a separate study. Cholesterol content (mg/g of yolk) averaged  $13.40 \pm 0.38$  in WL,  $13.65 \pm 0.61$  in WB, and  $14.58 \pm 0.61$  in FY; egg wt. was correspondingly  $53.8 \pm 0.72$ ,  $46.5 \pm 0.96$  and  $48.9 \pm 0.78$ ; yolk wt. was  $17.0 \pm 1.17$ ,  $15.3 \pm 0.35$  and  $16.3 \pm 0.28$ ; mg cholesterol/yolk was  $227.8 \pm 7.82$ ,  $207.3 \pm 9.16$  and  $237.4 \pm 9.13$ . Correlations between the various parameters were measured. LH

125

[Studies on lactic acid fermentation of whole egg. I. Study on sterilization method of whole egg and fermentation of sterilized whole egg by lactic acid bacteria.]

Katamine, S.; Sekimoto, K.; Mochida, Y.; Shisai, Y.; Furukawa, N.; Yamanaka, Y.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 24 (9) 472-478 (1977) [18 ref. Ja, en] [Res. Cent., Nihon Nosen Kogyo Co. Ltd., Daimura-cho, Midori-ku, Yokohama, Japan]

Liquid whole egg was completely sterilized by 2 to 3 successive pasteurizations at  $58^\circ\text{C}$  for 30 min, holding between pasteurizations at  $37^\circ\text{C}$  for 2-3 h. Several *Lactobacillus* and *Streptococcus* strains were tested for growth on the egg; the main acids produced were lactic with small amounts of pyruvic and acetic acids later in the fermentation. [From En summ.] JRR

126

The vitelline membrane: dynamics of cholesterol metabolism in hens' eggs.

Smolinska, T.; Trziszka, T.

*Food Chemistry* 8 (3) 215-223 (1982) [19 ref. En] [Inst. of Storage & Food Tech., Agric. Acad. Norwida 25/28, 50-375 Wroclaw, Poland]

Changes in cholesterol levels in eggs were studied to indicate trends and dynamics of processes of penetration through the vitelline membrane from yolk to egg white. Eggs were stored for 35 days at room temp. ( $22^\circ\text{C}$ ), and levels of free and esterified cholesterol determined by spectrophotometry at 7-day intervals. The study demonstrated that the vitelline membrane loses its selective nature between the twentieth and thirtieth days under these conditions of storage. Following this period, a spontaneous penetration of cholesterol into the egg white was observed. The presence of free cholesterol in egg white may be indicative of loss of freshness. AS

127

[Animal husbandry and product quality: eggs.]

Tierhaltung und Produktqualität: Eier.

Scholtysek, S.

*Züchtungskunde* 53 (5) 410-415 (1981) [10 ref. De, en, fr, ru] [Inst. für Tierhaltung & Tierzuchtung, Univ. Hohenheim, 7000 Stuttgart 70, Federal Republic of Germany]

Factors influencing egg quality (wt., shell colour, shell strength, shelf-life, nutritional value, functional properties, organoleptic properties, microbiological quality) are discussed, with reference to strain, diet, housing, hygiene, and storage and packaging of the eggs. AJDW

128

[Vitamin composition of eggs in the spring period.]

[In 'Problemy kachestva i biologicheskoi tsennosti pishchevykh produktov' [see FSTA (1982) 14 11G722]]

Repnikov, B. T.; Timush, L. F.

pp. 194-200 (1979) [Ru] [Leningradskii Inst. Sovetskoi Torgovli im. F. Engel'sa, Leningrad, USSR]

Eggs obtained during March, April and May 1978 from the Zhigulevsk (USSR) poultry factory with 90 000 layers producing 167.1 million eggs/yr were analysed in the laboratory of the Kuibyshev regional veterinary and sanitary station. Data on composition of batches received on the 10th, 20th and 30th of each month are tabulated. Mean monthly values were resp.: carotenoids, 6.90, 13.80 and 15.30  $\mu\text{g/g}$  yolk; vitamin A, 10, 4.58 and 7.20  $\mu\text{g/g}$  yolk; riboflavin, 3.30, 4.45 and 4.90  $\mu\text{g/g}$  yolk; protein, 15.9, 16.1 and 16.2%; fat, 11.0, 12.5 and 11.6%; ash in egg white, 4.5, 4.5 and 4.5%; and ash in egg yolk, 3.5, 3.8 and 4.0%. Modification of hens' diets to increase vitamin A content in March and April, and that of carotene generally are recommended. SKK

129

[Enhancement of biological stability and anti-adhesive properties of packaging materials for food products.] (In 'Problemy kachestva i biologicheskoi tsennosti pishchevykh produktov' [see FSTA (1982) 14 11G722])

Lazarev, E. N.; Slesar', L. N.; Gerasimova, V. A.; Morozova, N. N.  
pp. 12-20 (1979) [Ru] [Leningradskii Inst. Sovetskoi Torgovli im. F. Engel'sa, Leningrad, USSR]

Means of increasing durability of paperboard egg trays with nests for individual eggs were studied, enhancement of anti-microbial and anti-adhesive properties, water resistance, and stability when wet being sought. For this purpose, solutions of emulsions of AMSR-3 (sodium aluminium methylsiliconate), GKZh-94 (polyethylhydrosiloxane), KO-919 and KP-921 polymethylphenylsiloxane lacquers, and KLT-30 compound containing SKTN-1 polydimethylsiloxane oligomer were applied to the trays by brush or immersion, and the treated trays were dried 24 h in air, 1 h at 100°C, and 15 min at 150°C. Treated and control trays were tested for anti-adhesive properties (measured by force needed to separate an egg stuck to its nest by a blended egg coating), water resistance (measured by wt. gain 24 h after placing 5 ml water in an egg nest), anti-microbial properties (counts of bacteria and fungi in natural and experimental contamination after laboratory storage or industrial-type use). Final tests were carried out under industrial conditions, trays with eggs being stored at -0.5°C and 85% RH for ≤ 250 days, and examined at intervals. The procedures are described in detail and results are fully tabulated for all variants. Relative merits of the different treatments in the different aspects of protection are extensively discussed with regard to behaviour of control trays. The overall conclusion was that the organosilicon compounds studied were capable of substantially increasing the quality and durability of egg trays. SKK

130

The elegant egg.

Woodin, G. B.

*Food Product Development* 15 (4) 44, 48, 50, 52, 55 (1981) [En]

Consideration is given to: the egg and its composition; egg yolk and white; inspection requirements for shell eggs and egg products; inspection of the egg interior; quality grading; and egg products. A specifications guide is presented for: liquid or frozen white, yolk and whole; and for whites, whole and yolk solids. The nutrient composition of liquid/frozen and dehydrated eggs is tabulated. VJG

131

Special Report No. 4. Egg pasteurisation.

Jones, J. M.; Monsey, J. B.; Payne, J.  
*Report, ARC Food Research Institute 1979-1980*, 18-21 (1981) [16 ref. En] [Food Res. Inst., Colney Lane, Norwich NR4 7UA, UK]

This report describes the test for adequate heat treatment of egg albumen and considers the bacteria surviving the pasteurization of whole egg. VJG

132

Special Report No. 2. Rapeseed meal and egg taint. Fenwick, G. R.; Hobson-Francock, A.; Land, D. G. *Report, ARC Food Research Institute 1979-1980*, 9-13 (1981) [11 ref. En] [Food Res. Inst., Colney Lane, Norwich, NR4 7UA, UK]

The inclusion of rapeseed meal in poultry rations is restricted because of its association with liver abnormalities and egg taint. Aspects considered are: egg taint; the tainting substance and its detection; identification of rapeseed components involved in the tainting syndrome; and ways of solving the tainting problem. VJG

133

The effect of replacing fish meal with a part of soybeans or decorticated cottonseed meal on fertility, hatchability and egg production of Fayoumi hens. Abdel-Rahman, M. M.; Fouad Shehata, A.

*Monoufia Journal of Agricultural Research* No. 3, 163-181 (1980) [24 ref. En, ar] [Fac. of Agric., Monoufia Univ., Egypt]

8 × 8 month old Fayoumi hens and 16 × 1 yr old Fayoumi cocks were given diets containing a basal 15% maize + 50% rice bran + CaCO<sub>3</sub>/NaCl/vitamin supplement plus (i) 35% ground soybean (GS), (ii) 35% decorticated cottonseed meal (DCM), (iii) 30% DCM + 5% fish meal, or (iv) 30% GS + 5% fish meal. Eggs produced in the 7th-12th month after diets began were examined for composition; dressing % of 1 yr old hens was also established. Diets (i)-(iv) gave the following results (tabulated), resp.: average egg wt. 40.84, 40.82, 39.46, 45.68 g; egg yolk % 29.29, 32.19, 31.17, 32.44; egg white % 53.94, 53.16, 53.73, 53.37; egg shell % 16.77, 14.65, 15.10, 14.14; egg yolk cholesterol 19.1, 12.1, 22.2, 14.7 mg/g; dressed wt. % 85.39, 85.21, 84.98, 85.28. Data on wt. of various other organs is also included. Diet (iv) is recommended for egg production in Fayoumi hens. LH

134

Development of high heat resistance in *Arizona* neotype by preincubation at 35°C in media containing NaCl. Ng, H.

*Applied and Environmental Microbiology* 43 (6) 1294-1299 (1982) [7 ref. En] [W. Reg. Res. Cent., USDA, Berkeley, California 94710, USA]

It is known that *Arizona* cells can develop higher heat resistance if they are preincubated in a medium containing NaCl. Because present USDA regulations permit the holding of salted egg products at 18.3°C for ≤ 30 h, the increase in heat resistance caused by the preincubation of egg in the presence of NaCl may constitute a potential public health hazard. The present studies showed that when cells of *Arizona* neotype were preincubated at 35°C in a medium containing NaCl (1-10%), they were found to be much more heat resistant when tested at 57°C in a Trypticase (BBL Microbiology Systems) soy-yeast extract broth medium containing 10% NaCl than cells that had not been preincubated. Although no growth takes place during preincubation in the presence of 10% NaCl, some metabolic activity is necessary, since the presence of 2,4-dinitrophenol during incubation reduced the amount of gain in heat resistance. Incubation in the presence of N<sub>2</sub>, instead of air, abolished the effect. Chloramphenicol

and rifampicin, however, had no effect. Preincubated cells were just as heat resistant when separated by centrifugation and suspended in a fresh medium as when suspended in the incubated supernatant liquid. Conversely, the incubated supernatant liquid did not confer increased heat resistance on unincubated cells. The increase in heat resistance, therefore, is probably a result of the salt osmotically plasmolysing the cells by removing intracellular water, thus rendering the cellular contents more stable to heat. It is not known, however, why metabolic activity is necessary. AL

### 135

#### Egg quality evaluation by selected physical markers.

Csuka, J.; Ledec, M.

*Roczniki Naukowe Zootechniki* 8 (2) 45-58 (1981)

[18 ref. En, pl, de, ru] [Vyskumny Ustav Chovu a Sl'achtenia Hydiny, 900 28 Ivanka pri Dunaji, Czechoslovakia]

Studies were conducted on the quality of eggs from 8 laying hen populations. Characteristics studied were Haugh unit score, yolk index, albumen index, egg wt, height of thick albumen, DM content of total albumen, yolk vol., yolk refraction value, yolk/albumen ratio, total egg contents vol., total albumen vol., thick albumen vol. and thin albumen vol. Tables of data for these characteristics are given, together with correlations of Haugh unit score, albumen index and yolk index with the other traits studied. Differences between the eggs laid by the various hen populations are discussed. Correlations of Haugh unit score, yolk index and albumen index with egg wt, DM content of albumen, yolk refraction, yolk/albumen ratio, and vol. of yolk and albumen are low. Evaluation of egg quality and freshness by detn. of the yolk index and albumen index is recommended; DM content of yolk and albumen should be determined by refractometry. AJDW

### 136

#### [Persistence of residues of antibiotics in eggs after treatment of laying hens.]

Labie, C.

*RTVA* 21 (176) 19-22, 27, 29 (1982) [9 ref. Fr] [Ecole Nat. Vet., 23, Chemin des Capelles, 31076 Toulouse Cedex, France]

Groups of Rhode Island Red broilers were treated with (i) penicillin G + procaine penicillin, (ii) benzyl penicillin, (iii) dihydrostreptomycin, (iv) neomycin, (v) framycetin, (vi) chloramphenicol, (vii) erythromycin, (viii) leucomycin or (ix) tetracycline, administered in the drinking water or by intramuscular injection, for 3-5 days. The yolk and albumen were separately tested for antibiotic residues by microbiological methods.  $\leq$  15 days after the start of treatment (iii) administered by injection was the only antibiotic giving residues in both albumen (for  $\leq$  6 days after treatment) and yolk (for  $\leq$  14 days). Residues in the albumen (but not the yolk) were given by: (i) administered by injection (up to 3 days after the start of treatment); (ii), injected (up to 13 days); (ix), oral administration (up to 4 days); and (vii), injected (up to 3 days). No residues were detectable in the albumen or yolk of eggs laid by hens injected with (viii), or treated with (iii), (iv), (v), (vi), (vii) or (ix).

### 137

#### Performance of laying hens fed diets containing soybean gums, rapeseed gums or rapeseed meals with and without gums.

Hulan, H. W.; Proudfoot, F. G.

*Canadian Journal of Animal Science* 61 (4) 1031-1040 (1981) [13 ref. En, fr] [Res. Sta., Agric. Canada, Kentville, Nova Scotia B4N 1J5, Canada]

2 experiments were conducted to evaluate effects of soybean and/or rapeseed meals (SBM and RSM, resp. gummed or gumless) on performance and mortality of laying hens. Egg quality was examined in terms of wt, sp. gr., Haugh units, yolk colour; carcasses of layers which died during the study were studied for organ wt. Results are tabulated. Low levels (0.4% by wt.) of gums in the diet appeared to have no deleterious effects on layer performance, but higher levels (2.0% by wt.) of gums increased mortality and feed required to produce 12 eggs; some layer genotypes were more sensitive to gums in the diet than others; Candle RSM gums but not Tower RSM gums seemed to be deleterious to laying hens (sp. gr. of eggs was better in one study for hens fed Tower gums than for controls); Haugh units were unaffected by gummed vs. gumless Tower RSM, but presence of Candle gums increased Haugh unit value. LH

### 138

#### [Haugh units and the internal quality of shell eggs.]

Schmidt, S.; Rybarova, B.

*Hydinarsky Priemysel* 23 (9/10) 375-387 (1981) [14 ref.

Sk] [Vyskumny Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Method for the detn. of Haugh units as an indicator of inner quality of shell eggs was investigated. The average values for Haugh units, established for eggs 1, 3 and 5 days old were equal to Haugh units of eggs commercially graded according to their wt. In all cases the egg hybrid Shaver Starcross 288 was tested. Studies confirmed the effect of storage and of the age of the laying hens on the inner quality of shell eggs. The characteristic course of the fall of Haugh units in relation to time of measuring the height of solid egg white is described. STI

# EGG PRODUCTS

## 1

[Salmonellosis in man and animals in Poland in 1971-1978.]

Anusz, Z.

*Medycyna Weterynaryjna* 36 (5) 265-267 (1980) [Pl, ru, en] [Panstwowy Zaklad Higieny, 00-791 Warsaw, Poland]

This extensive report includes the following information of more direct food interest. In 1978, there were in Poland 4 large epidemics of *Salmonella* food poisoning: 822 cases in Wroclaw province of *Salmonella enteritidis* infection from cream and milk, 701 cases in Suwalski province of *S. typhimurium* infection from ice cream, 501 such cases, also from ice cream in Katowice province, and 492 cases in Legnica province of *S. enteritidis* infection also from ice cream. Causes of food poisoning outbreaks with  $\geq 4$  cases in 1 locality were in 1971, 1972, and 1973-1976 resp.: meat and meat products, 37.2, 58.8, and 43% of all outbreaks, and fish and fish products, 0.6, 7.0 and 21.2%; and in 1973-1976, ice cream and cakes accounted for 15.2% and eggs for 8.7%. In 1977 and 1978, the incidences were: meat dishes 52.2 and 22.2%, ice cream and cakes 12.0 and 39.7%, dairy and egg products 5.4 and 14.9%, and fish 1.6 and 1.9%. A large proportion of outbreaks occurred in commercial feeding establishments, schools and youth camps. SKK

## 2

Freezing liquid egg product in plastic bag ensures freshness and eases preparation.

Anon.

*Quick Frozen Foods* 43 (1) 36-37, 41 (1980) [En]

Crystal Lake Egg Products of Warsaw, Indiana, USA has introduced a frozen egg-in-a-bag product. The liquid egg product is pasteurized after the necessary ingredients have been added, cooled and pumped from 6 rotating nozzles of a Cryovac X-8133 pump filler into Cryovac's flexible plastics C-300 casing. Up to 20 packages/min can be handled. They are then dropped on a conveyor and transported to a pack-off room. The product can be cooked in the bag from either thawed (20-25 min) or frozen (30 min) state to simplify preparation and clean up. Leaving the scrambled eggs in the unopen bag maintains serving temp. for up to 1½ h. The product is marketed in 2 formulations, one for bakeries and hospitals, and the other for restaurants and large institutions. VJG

## 3

Quality of egg nog.

Hankin, L.; Shields, D.; Hanna, J. G.

*Bulletin, Connecticut Agricultural Experiment Station* No. 793, 4pp. (1980) [5 ref. En] [Connecticut Agric. Exp. Station, PO Box 1106, New Haven, Connecticut 06504, USA]

The microbial, nutritional and keeping quality of 28 samples of nonalcoholic commercial egg nog were estimated during storage at 4.4°C up to the coded use-by-date. 2 samples exceeded the 50 000 g standard bacterial plate count, most containing  $< 1000$ /g. Acidity (as % lactic acid) ranged from 0.12 to 0.20; total solids % was 22.3-40.2; fat content as g/227 g was 12.1-21.5; protein content as g/227 g was 6.1-10.7; carbohydrate (g/227 g) was 28.6-59.6; egg yolk solids (%) was 0.3-1.6; sodium (mg/100 g) was 58-178; and kcal/227 g was 265-461. Thus purchasers were generally receiving a good product which conforms to the label.

## 4

[Rheological, biochemical and organoleptic properties of low-fat cheese with dried egg.]

Zharenov, D. A.; Tolkachev, A. N.; Tabachnikov, V. P.; Rogova, N. S.; Titova, N. N.

*Trudy, Vsesoyuznyi Nauchno-issledovatel'skii Institut Maslodel'noi i Syrodel'noi Promyshlennosti Nauchno-proizvodstvennogo Ob'edineniya 'Uglich'* No. 27, 78-82, 119-120 (1979) [8 ref. Ru] [VNIIMiSP, Uglich, USSR]

In continuation of preliminary experiments [FSTA (1976) 8 11 P2239], 'Vesennyi' low-fat cheese (20% fat in DM) was made from 300-l batches of milk with addition of 5 g dried egg/l as homogenate in skim milk; Pribaltiiskii cheese of the same fat content, and Kostroma cheese of 45% fat in DM were made from parallel batches. Rheological characteristics of the cheeses were determined as described by Tabachnikov et al. [FSTA (1979) 11 6P953]; and volatile fatty acids were estimated by GLC. Vesennyi cheese was intermediate between the other 2 in rheological properties and in contents of volatile fatty acids; it contained, however, more water-soluble peptides, the values being 56.0 vs. 38.8 for Pribaltiiskii and 28.1 mg% for Kostroma. In organoleptic evaluation on taste and aroma, consistency, surface appearance and colour, Vesennyi received the same score as Kostroma, to which it is considered to be generally similar in important characteristics. SKK

## 5

Chinese FF firm says cryogenic unit enhances production efficiency, quality.

Anon.

*Quick Frozen Foods* 43 (5) 33 (1980) [En]

Production of frozen Chinese food at Wong Wing Foods Products Co., of Montreal, Quebec, Canada, is described. A 30 ft cryogenic freezer is now used for such items as egg rolls, won ton soup and frozen entrees, which used to be blast frozen. This CO<sub>2</sub> freezing has made improvements in production efficiency and in product quality. Instead of spending a day in the blast freezer to be thoroughly frozen the egg rolls spend only 5-8 min passing through the cryogenic freezer. Wong Wing are able to freeze 1 and a half million egg rolls/wk, thus doubling their freezing capacity. VJG

## 6

[Use of hens'-egg compounds as fillers in butter manufacture.]

Vyshemirskii, F. A.; Lymar', V. G.

*Trudy, Vsesoyuznyi Nauchno issledovatel'skii Institut Maslodel'noi i Syrodel'noi Promyshlennosti* No. 28, 29-34 (1979) [3 ref. Ru] [VNIIMiSP, Uglich, USSR]

Tests are described in which fresh or cooked egg white or egg yolk were added separately or together at 5-30% in butter manufacture, but results were organoleptically unsatisfactory. Addition of dried unfermented or fermented egg to high-fat cream at 3-15 vol.% proved more promising. The following procedure was finally chosen: dried fermented egg (differing from unfermented by content of 0.1 vs. 1% glucose) at 5-8% of final butter was mixed with warm (40-45°C) buttermilk in the 1:3-4 proportion, pasteurized at 70-72°C for 15-20 min and emulsified; the emulsion was added to high-fat cream, and was

cooled to 41–45°C, 7% bacterial starter was added, and the whole was made into butter by phase reversal. Butter composition according to amount of dried egg added was: fat 51% (including 1.8–2.9% egg fat), milk SNF 3.5–3.9%, egg SNF 2.8–4.4 and moisture content 37.5–40%. The butter had a pleasant, original taste and aroma. Data for Butterbrodnoe (sandwich) ripened-cream salted butter are tabulated in comparison; and biochemical changes in both during storage are graphically presented. Storage life of the butter with egg at –3°C (lower temp. reduced quality) was 20 days for 20-kg blocks, and 10 days in retail plastics cups.

SKK

## 7

**Alpha-amylase test as a method for distinguishing unpasteurized egg products from pasteurized products.**

Imai, C.

*Poultry Science* 58 (4) 815–823 (1979) [11 ref. En] [Lab. of Q. P. Corp., Sengawa-cho, Chofu-shi, Tokyo 182, Japan]

Studies on development of a modified  $\alpha$ -amylase test for differentiation of pasteurized from non-pasteurized liquid egg products are described. Trials were conducted on laboratory-prepared liquid egg white, egg yolk, and whole egg, sugared or salted liquid yolk or whole egg, and commercial samples of frozen egg. Experimental samples were pasteurized at temp. over the range 56–66°C. The FAO-WHO  $\alpha$ -amylase test was used, either in its original form or with modifications to the sample wt., quantity of starch solution, and incubation time. Effects of pasteurization conditions, yolk contamination of albumen, freshness and location of production of the eggs, addition of salt or sugar to the egg, or chilling or freezing on the reliability of the technique were studied. Tables of results are given and discussed in detail. Modified test conditions for the various products under consideration are suggested. The modified methods could be used to reliably differentiate pasteurized samples of all types of sample studied. AJDW

## 8

**[Storage of brine-pickled hard boiled eggs.] Über die Lagerung von Soleiern.**

Seeger, H.; Biru, G.; Gemmer, H.

*Archiv für Lebensmittelhygiene* 32 (2) 46–49 (1981) [4 ref. De, en] [Staatliches Veterinäruntersuchungsamt, 6000 Frankfurt am Main, Federal Republic of Germany]

25 shelled hard boiled hen's eggs were stored in 5% brine at room temp. (20°C) or refrigerated (+5°C). Samples were examined at 2–4 day intervals for sensory, bacteriological and chemical (pH, H<sub>2</sub>S) quality. Tabulated results showed that the eggs were no longer fit for consumption after 8 days at room temp. or after 34 days in the refrigerator. RM

## 9

**[Egg powder. Quality regulations.] Eipulver. Gütevorschriften.**

German Democratic Republic, Institut für Milchforschung der DDR

*German Democratic Republic Standard TGL 24973/01, 5pp. (1978) [De]*

This standard applies to dried whole egg, dried yolk and dried white, each divided into 2 quality grades. Requirements cover contents of fat in DM, free fatty acids, total DM, solubility, proof of adequate pasteurization (extinction measurement), bacterial count, and coliforms (absent in 0.1 g product). The standard also deals with packaging, storage and transport. KME

## 10

**[Egg powder. Sensory quality test.] Eipulver. Sensorische Qualitätsprüfung.**

German Democratic Republic, Institut für Milchforschung der DDR

*German Democratic Republic Standard TGL 24973/02, 3pp. (1978) [De]*

This standard applies to dried whole egg, dried yolk and dried white. Assessment is on a points system (0–5) for appearance, odour and taste. Evaluations shall be made at 18°C. KME

## 11

**[Testing of egg products. Determination of bacterial count with nutrient agar medium I.] Prüfung von Eierzeugnissen. Bestimmung der Keimzahl mit Nähragar I.**

German Democratic Republic, Institut für Milchforschung der DDR

*German Democratic Republic Standard TGL 24975/09, 2pp. (1978) [De]*

This standard applies only to dried egg products, and stipulates the taking of a bacterial count by inoculating test samples into liquid nutrient agar medium I, incubating after solidifying, and counting the number of colonies formed, which corresponds approx. to the number of organisms present. KME

## 12

**Microwave heating of scrambled eggs in a hospital foodservice system.**

Cremer, M. L.

*Journal of Food Science* 46 (5) 1573–1576, 1581 (1981) [En] [Ohio State Univ., School of Home Economics, 1787 Neil Avenue, Columbus, Ohio 43210, USA]

Temp. of scrambled eggs (117 portions) after heating in microwave ovens in a hospital foodservice system were examined to determine the extent to which temp. could be controlled in actual foodservice operation, and the relationship of voltage, portion wt., temp. before heating, and power (W) within ovens to temp. of food after heating in actual operation. Temp. variability was controlled to the extent of 5°C (average 2 scoops), as indicated by the s.d., with 96% of the temp.  $\geq$  74°C as indicated by standard score conversion. Significant ( $P < 0.01$ ) negative correlation was found between temp. of eggs after heating and voltage; this occurred within a range of 3 V. Temp. after heating was significantly ( $P < 0.01$ ) positively correlated with temp.

before heating and negatively correlated with portion wt. ( $P < 0.05$ ). No significant relationship was found between temp. and power (W) within ovens but voltage was significantly ( $P < 0.01$ ) negatively correlated with power. Food may be heated in microwave ovens in foodservice systems if factors influencing heating are rigidly controlled, but complete safety cannot be assured. IFT

## 13

### Worldwide standards needed for egg products.

Enthoven, W.

*Poultry International* 19 (13) 34, 36, 38, 109, 115 (1980) [En, de, It, fr, es, ja, ar]

Use of liquid, dried and concentrated egg products in the food industry is discussed, with reference to: world trade; the main importing and exporting countries; the trend from liquid or frozen to dried products; quality differences between liquid egg produced by specialized factories and that produced as a by-product by egg packing plants; problems with international trade, as a result of different analytical methods etc. being specified by different countries; and the desirability of establishment of international standards. AJDW

## 14

### Egg-in-a-bag satisfies caterers' appetites.

Anon.

*Poultry International* 19 (13) 52, 54, 109-110, 114 (1980) [En, de, fr, it, es, ja, ar]

Marketing of frozen liquid egg products (e.g. scrambled egg mix) in 4 or 8 lb Cryovac bags by Crystal Lake Products and the Armour Food Service Division is briefly described. The product is cooked in the sealed bag, thereby minimizing equipment cleaning problems. After cooking, the product remains hot in the sealed bag for  $\leq 1.5$  h. Other advantages include easy storage, good shelf life and reduced product preparation time. AJDW

## 15

### [Effect of processing on *Salmonella* contamination of dried food products.]

Görner, F.

*Prumysl Potravin* 32 (1) 56-59 (1981) [Sk] [Katedra Tech. Mikrobiol. & Biochem., Slovenska Vysoka Skola Tech., Bratislava, Czechoslovakia]

This review-type article discusses incidence and origin of outbreaks of *Salmonella* food poisoning in Czechoslovakia, and deals in detail with various aspects of egg processing, with particular reference to drying and survival therein of salmonellae and to recontamination of the dried product. A list of references may be obtained from the author. SKK

## 16

### [Fermented egg product.]

Nihon Nosen Kogyo

*Japanese Examined Patent* 5 626 389 (1981) [Ja]

A fermented egg product is prepared by sterilizing a sweetened whole egg solution at 55-62°C, adjusting the pH with a weak acid, and inoculating the composition with a specified *Streptococcus* or *Lactobacillus* microorganism, followed by culture for approx. 18 h. The fermented egg solution has no egg odour and has excellent flavour and colour. AS

## 17

### [Egg product.]

Ibigawa Electric KK

*Japanese Examined Patent* 5 622 255 (1981) [Ja]

A dried food product similar to boiled egg slices is prepared from a mixture of egg yolk and/or white and starch, and contains oligosaccharide, seasoning, and pigment etc. The materials are mixed with water to form a slurry, packaged in heat resistant plastics tubes and heat coagulated. The product is sliced and dried. The dried product is easily reconstituted with hot water to give a product similar in taste, tissue and appearance to boiled egg. AS

## 18

### Nisin controls bacteria in egg products.

Niewiarowicz, A.

*Poultry International* 19 (13) 64 (1981) [En] [Inst. of Anim. Products Tech., Poznan, Poland]

Studies were conducted on use of added nisin for enhancement of the efficacy of pasteurization of egg white and liquid whole egg. Samples of the egg products (i) without added *Staphylococcus pyogenes* or nisin, (ii) with addition of *Staph. pyogenes* at  $2 \times 10^6$  cells/g but no nisin or (iii) as (ii) but with 0.02% nisin were used. Egg white was adjusted to pH 6.9 or 9.2, and pasteurized at 55° or 57°C; liquid whole egg (pH 7.6) was pasteurized at 56°, 58° or 60°C. A table of results is given for *Staph. pyogenes* counts in the pasteurized products. The results show added nisin to increase the efficacy of pasteurization in both egg white and liquid whole egg. In egg white, the effect of added nisin was greater at pH 6.9 than at pH 9.2. AJDW

## 19

### Sensory panel evaluation of pickled eggs.

Acton, J. C.

*Poultry Science* 60 (6) 1348-1349 (1981) [8 ref. En]

[Dep. of Food Sci., Clemson Univ., Clemson, S. Carolina 29631, USA]

A bimodal distribution was found for the like-dislike characteristic in preference testing of a pickled egg product. The characteristic was a simple choice between the preferences expressed for the vinegar ingredient as the major flavour component of the pickling medium. AS

## 20

[Egg product.]  
QP Corp.

*Japanese Examined Patent* 5 606 245 (1981) [Ja]

The Chinese food Peatan is prepared by immersing poultry eggs in an alkaline solution, sealing them in a gas-tight vessel, and subjecting them to heat treatment at  $\geq 58^\circ\text{C}$ . AS

## 21

[Method for the manufacture of egg liqueur.]

Verfahren zur Herstellung von Eierlikör.

Mohr, K.-H.; Spengler, J.; Bauer, W.; Anter, W.

*German Democratic Republic Patent* 149 376 (1981)

[De]

In the manufacture of egg liqueur, pasteurized freeze-stored egg yolk should be used, with or without added sugar. Before liqueur production the thawed egg yolk is lightly beaten at temp.  $> 0^\circ\text{C}$  (max.  $5^\circ\text{C}$ ) for 1-10 h. IN

## 22

[Method for the manufacture of storage-stable egg liqueur.] Verfahren zur Herstellung von lagerstabilem Eierlikör.

Mohr, K.-H.; Spengler, J.; Bauer, W.; Anter, W.

*German Democratic Republic Patent* 149 377 (1981)

[De]

In the manufacture of egg liqueur, pasteurized freeze-stored egg yolk should be used with or without sugar addition. After thawing, the egg yolk is beaten at  $0-5^\circ\text{C}$  for several h. Before mixing with sugar solution and alcohol the egg mass is subjected to mechanical shear forces until viscosity (measured at  $20^\circ\text{C}$ ) has decreased by  $\geq 300$  cP. Egg liqueur made with this egg mass shows no separation even after 8 months storage at room temp. IN

## 23

[Classification and properties of eggs and egg products in industrial manufacture of pastry products.]

Delmer, M.

*Revue des Industries de la Biscuiterie, Biscotterie, Chocolaterie, Confiserie* No. 43, 5, 7-9, 11 (1981) [Fr]

Topics discussed in this brief paper on industrial uses of eggs in pastry manufacture include the composition of the white and the yolk fractions, criteria for classification of eggs into classes A, B and C, and requirements for egg products other than shell eggs. Commercial egg products are surveyed, including liquid, frozen, powdered and concentrated types, and the functional properties of eggs in food systems are discussed. Practical tests for foaming ability and other properties are described. JRR

## 24

[Changes in choline-containing phospholipids of quail eggs during pidan-making.]

Toyosawa, I.; Nakano, S.; Asakura, T.; Wakabayashi, J.  
*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 24

(1) 19-24 (1977) [13 ref. Ja, en] [Dep. of Food Sci., Mukogawa Women's Univ., Ikekiraki-tyo, Nishinomiya-shi, Japan]

Pidan was produced by immersing eggs in brine (containing 5% NaOH, 10% NaCl and 2% black tea) for 14 days at  $25^\circ\text{C}$ , followed by removal from the brine and ripening for 7 days at room temp. Examination of egg yolk during immersion indicated that the choline-containing phospholipid content decreased rapidly while the glycerophosphorylcholine (GP) content increased gradually; in egg white, the GP and free choline (FC) contents increased gradually from the third day of immersion. Studies of the alkaline hydrolysis of phosphatidylcholine (PC) and GP isolated from fresh egg yolk indicated that, during pidan production, egg yolk PC is hydrolysed first to lysophosphatidylcholine, then to GP and finally to FC. [From En summ.] JA

## 25

Quality attributes of whole egg and albumen mixtures cooked by different methods.

Chen, T. C.; Hsu, S. Y.

*Journal of Food Science* 46 (4) 984-986 (1981) [14 ref. En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Whole egg and albumen mixtures were prepared and cooked by the following methods: pan scrambled in a double boiler; pan scrambled in a Teflon coated skillet; boil-in-bag in boiling water; and cook-in-bag in a microwave oven. Yields, weeping, and content of volatile flavour components in the cooked products were measured. Cooking yields were higher for those cooked by the boil-in-bag and cook-in-bag methods than for those pan scrambled. Regardless of cooking method, yields of the albumen product were lower than the whole egg product. Products prepared by the cook-in-bag method had lower weeping %. The methods of cooking affected the major volatile contents of the products slightly. Double boiler scrambled whole egg product contained less  $\text{H}_2\text{S}$ ,  $\text{NH}_3$  and total carbonyls than those prepared by other methods. IFT

## 26

[Effect of bread-crumb and egg coating and of drying on stability of frozen fish fillets.]

Kolakowski, E.; Jachimiak, W.

*Przemysl Spozywczy* 35 (3) 96-99 (1981) [11 ref. Pl, ru, en, fr, de] [Inst. Tech., Zywosci Pochodzenia Morskiego, AR, 71-424 Szczecin, Poland]

Portions of hake fillets and mackerel fillets taken from 10-kg frozen blocks without and with skin resp., were stored at  $-28^\circ\text{C}$  in individual packs either (i) without treatment, or (ii) in bread-crumb and egg coating, or (iii) as (ii) and fried. Changes in organoleptic assessment, hardness and consistency; and (on blended material) contents of dimethylamine and formaldehyde, proteins soluble in 2.5 and 4% aqueous NaCl solutions, amino N, trimethylamine and volatile bases, and peroxide, thiobarbituric acid, and acid values were determined in (i)-(iii) at intervals during storage. Analytical methods are stated and results are graphically presented; organoleptic scores are

tabulated for (i)–(iii) as such and after frying. It is concluded that (ii) and (iii) treatments, (ii) in particular, had a beneficial effect on frozen fillet stability. Storage lives at  $-28^{\circ}\text{C}$  recommended for hake fillets were, for (i)–(iii) resp., 3–4, 6–7 and 7–8 months; and for mackerel fillets, they were correspondingly 2–3, 5–7, and 3–4 months. The (ii) procedure is recommended for mackerel fillets. SKK

## 27

[Formation of lysinoalanine residues during alkaline treatment of egg white.]

Murase, M.; Goto, F.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 24 (11) 547–552 (1977) [17 ref. Ja, en] [Food Res. Inst., Aichi Prefectural Government, Shimpukuji-cho, Nishi-ku, Nagoya, Japan]

An amino acid analyser was used to determine lysinoalanine (LA) in commercial pidans (alkali-treated eggs) and in laboratory-prepared chicken and quail pidans. LA levels found were 2.8–9.3 mm/100 g protein in egg white and 2.9–8.7 mm/100 g protein in egg yolk. Studies of LA formation in chicken egg white during heating in water for  $\leq 30$  min indicated that LA formation increased with increasing time, temp. and pH.  $\text{Na}_2\text{CO}_3$  was found to play a specific role in LA formation. [From En summ.] JA

## 28

Sunny Time Foods pioneering in frozen egg products. Mans, J.

*Processed Prepared Food* 150 (5) 64–67 (1981) [En]

A description is given of the production of egg products at Sunny Time Foods, Inc., of Des Moines, Iowa, USA. In 1980 the company sales exceeded \$3 million, most of which was individual quick frozen (IQF) products. The company have developed a line of IQF hard boiled egg products, including chopped eggs, and half eggs, that cannot be told from fresh eggs after thawing. The frozen, cooked eggs are packed into 5 and 20 lb bags. The pieces of the chopped eggs remain individually frozen so the user can pour the amount he requires and reclose the bag. The production of scrambled egg patties is also described. VJG

## 29

[Heat sensitivity of bulk egg.]

Aleksandravichus, A. B.; Brazhnikov, A. M.; Kosmodem'anskii, Yu. V.; Bulgakov, N. I.

*Myasnaya Industriya SSSR* No. 5, 37–38 (1981) [Ru] [Litovskii Filial VNIIMSA, USSR]

Mathematical formulae and graphs are given to show the dependence of the rate constant of the solubility decrease on the concn. of the bulk egg mix. It is considered that, at first approximation the heat sensitivity may be expressed as an exponential relationship. STI

## 30

Microbiological quality of pasta products sold in Canada.

Rayman, M. K.; Weiss, K. F.; Riedel, G. W.; Charbonneau, S.; Jarvis, G. A.

*Journal of Food Protection* 44 (10) 746–749 (1981) [12 ref. En] [Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario, Canada K1A 0L2]

499 and 130 samples of Canadian and imported pasta products, resp., including products with and without egg, were analysed by standard procedures for aerobic plate count, coagulase-positive staphylococci, confirmed coliforms, faecal coliforms, *Escherichia coli*, *Salmonella* and yeasts and moulds. 1 imported and 2 domestic products contained *Salmonella*; domestic spaghetti contained *S. montevideo* and imported and domestic egg pasta contained *S. infantis*. Remaining results are tabulated as frequency distributions in population levels. Products varied widely in microbial population. On the basis of the results, a 3-class plan for acceptance or rejection of a pasta lot is proposed. If 'n' subsamples of a lot are examined, the lot is rejected if more than 'c' subsamples contain more than 'm' counts/g or if 1 subsample contains more than 'M' counts/g. For an  $n = 3$   $c = 1$  plan, values of  $m$  and  $M$ , resp., are proposed as follows: aerobic colony count  $5 \times 10^4$ ,  $1 \times 10^6$ ; *Staphylococcus aureus*  $2.5 \times 10^2$ ,  $1 \times 10^4$ ; *E. coli*  $1.0, 5 \times 10^2$ ; yeasts and moulds  $2 \times 10^3$ ,  $5 \times 10^4$ . In addition the lot is rejected if *Salmonella* is detected in 1 of five 25 g subsamples. Using this plan the predicted rejection rates of the pasta products analysed would be 8.5 and 8.2% for domestic products without and with egg, resp., and 4.1 and 9.1% for the corresponding imported products. It is suggested that an  $n = 5$ ,  $c = 2$  plan, with the same values of  $m$  and  $M$ , would be more discriminatory. DIH

## 31

Development, utilization and protein quality of potato:soy:egg flakes.

Hargett, C. A.; Nelson, A. I.; Weingartner, K. E.; Erdman, J. W., Jr.

*Journal of Food Science* 47 (2) 461–464 (1982) [En] [Dep. of Food Sci., 567 Bevier Hall, Univ. of Illinois, Urbana, Illinois 61801, USA]

Various ratios of potato:full-fat soy:whole egg (P:S:E) were combined and drum dried to yield flakes which were rehydrated and formed into baked or fried patties. Methods were developed to utilize either fresh or dehydrated potatoes for flake production. Sensory evaluations showed 60:34:6 P:S:E fried patties to be more generally accepted than baked patties. Freezing of the uncooked dough prior to frying or baking was shown to be a good storage method. P:S:E flakes (60:34:6) were also substituted for 12% of patent wheat flour in bread. P:S:E supplementation improved the protein efficiency ratio (PER) of patent flour wheat bread. PER values for 60:34:6 P:S:E flakes and baked patties were equivalent to those of casein. IFT

## 32

[Immunonephelometric determination of soft wheat in milling products and pasta.]

Bracciali, A.; Cantagalli, P.; Tarli, P.; Nero, P.

*Bollettino dei Chimici dei Laboratori Provinciali* 6 (S3) 337–343 (1980) [9 ref. It] [ISVT Selvato, Via Fiorentina 1, 53100 Siena, Italy]

A fast and accurate method is proposed for the detn. of soft wheat by immunonephelometry. Tabulated results for 11 samples of pasta, 6 of egg pasta and 12 of semolina (5-7 replicates/sample), showed close agreement with results from radial immunodiffusion, with s.d. 0.1-1.0 (as % of soft wheat). Intra-assay accuracy for 5-6 replicates of the 3 types of products gave s.d. of 0.2-0.6 (% soft wheat). The close agreement between the results by the 2 methods was confirmed by regression analysis (correlation coeff. 0.99 for pasta, 0.94 for semolina). The instrument used includes an electronic calculator expressing results directly in % soft wheat. 20-24 samples can be analysed in 3-4 h (vs. 3-4 days for analysis by radial immunodiffusion). RM

## 33

## Liquid egg blend.

Boldt, W. A.

*United States Patent 4 296 134 (1981) [En]*

An edible liquid egg blend product which is at least 99% cholesterol free, which has  $\leq 1.25$  wt.% fat, and a max. of 0.80 cal/g, is described. It comprises (by wt.): 60-96 parts liquid natural egg whites; 0-18 parts water; 2.0-10.5 parts protein replacement, e.g. non-fat dried milk solids, powdered egg albumen and soy protein; 0.2-0.95 part stabilizer; 0.1-2.5 parts flavouring; and 0.01-0.20 part colouring. The blend is intended to be refrigerated and used for preparing egg dishes, e.g. scrambled eggs, omelettes and souffles. It is particularly suited for those on a restricted cholesterol, restricted calorie or restricted fat diet. RAW

## 34

## Water-holding capacity and textural acceptability of precooked, frozen, whole-egg omelets.

O'Brien, S. W.; Baker, R. C.; Hood, L. F.; Liboff, M.

*Journal of Food Science 47 (2) 412-417 (1982) [En]*

[Dep. of Poultry &amp; Avian Sci., Cornell Univ., Ithaca, New York 14853, USA]

Precooked, frozen omelettes were analysed for moisture loss, expressible moisture, shear force, and sensory evaluation to determine water-holding capacity and textural acceptability. Addition of 0.1% xanthan gum, application of moist heat in cooking, and cryogenic freezing with liquid  $\text{CO}_2$  or  $\text{N}_2$  minimized moisture loss and shear force. Sodium carboxymethylcellulose, pregelatinized tapioca starch and sodium tripolyphosphate additives performed satisfactorily, but omelettes containing xanthan gum were consistently rated highest in sensory evaluation of several treatments, including fresh and untreated control omelettes. Steaming omelettes for 5 min. combined with cryogenic freezing produced a desirable omelette, requiring no additives. Steamed omelettes were rated comparable to baked omelettes in most sensory parameters. IFT

## 35

## [Method for preparing a foam dried food containing egg as a main ingredient.]

Shudo, A.

*Japanese Examined Patent 5 633 054 (1981) [Ja]*

An egg-containing, foamed, dried foodstuff is produced by mixing liquid egg with starch, protein and a flavouring agent, followed by blending, moulding and heating with high frequency current to foam and dry the product. IFT

## 36

## Scrambled eggs for 500?

Wesley, P.

*Food Product Development 15 (4) 24-25 (1981) [En]*

Armour Food Service offer preprocessed frozen egg mixtures in multi-serving plastics bags. The eggs are cooked by immersion in hot water, bag and all, producing as much as 8 lb of scrambled eggs per bag, using no cooking oil and leaving no pans to clean. The scrambled eggs stay hot for as long as 90 min. Production involves an automatic filler for the polyethylene casings. The machine fills each bag to a precisely predetermined wt., applying a clip closure. The entire mechanism fits in tandem with Crystal Lake's egg cracking and processing line. The line pumps up to 1000 cases of liquefied, pasteurized eggs into the filling machine during each 8 h shift. One operation can produce about 15 packages of egg product/min. The eggs are cooked by placing them in pots containing hot water (180-190°F), and agitating to prevent the liquid egg consolidating into 1 large omelette-like mass. The process takes about 30 min. VJG

## 37

## New development in drying egg products. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Bergquist, D. H.

pp. 7-14 (1981) [En] [Henningsen Foods Inc., Omaha, Nebraska, USA]

Developments in methods and equipment for drying of egg products are discussed. Aspects considered include: historical aspects; advantages of dried egg products; types of dried egg products, and their manufacture; special dried egg products (including dried egg-based mixes); technological progress; standards and legislation; chemical, physical, functional and microbiological properties of dried egg products; egg handling; breaking of eggs; separation of yolks from whites; pasteurization; concentration of liquid egg by ultrafiltration; elimination of glucose from liquid egg white; addition of whipping aids; spray-drying; packaging; and storage. AJDW

## 38

## An attempt at agglomeration of egg powder to improve its technological properties. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Trziszka, T.; Smolinska, T.

pp. 72-74 (1981) [9 ref. En] [Inst. of Storage &amp; Food Tech., Agric. Acad., Wroclaw, Poland]

Studies on agglomeration of dried egg products to overcome poor solubility and wettability are described. 2 agglomerating agents were tested: (i) 20% sucrose solution, and (ii) liquid egg. Egg powder agglomerated by these 2 methods was stored for  $\leq 6$  months in sealed glass jars at 19–21°C in the dark; (iii) non-agglomerated control samples were stored similarly. Samples were tested before storage and after storage for 3 or 6 months. Wettability was best for (ii); (iii) had much poorer wettability than either (i) or (ii). Dispersibility of (i) and (ii) powders was better than that of (iii); solubility was poorer than that of (iii). Friability of (i) and (ii) was better than that of (iii). Little deterioration of (i) or (ii) characteristics was observed during storage. AJDW

### 39

Flavor volatiles of scrambled egg products as affected by composition. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Hsu, S. Y.; Chen, T. C.

pp. 135–143 (1981) [19 ref. En] [Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Effects of the composition of scrambled egg mix on the flavour volatiles were studied; constituents considered included yolk, albumen, dried skim milk, corn oil, and lactic acid. Data are given for effects of omission of individual constituents on levels of  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ , methyl mercaptan, and various classes of carbonyl compounds. Omission of egg yolk increased whereas omission of egg white decreased  $\text{H}_2\text{S}$  content. Presence of non-fat milk solids, corn oil or lactic acid decreased  $\text{H}_2\text{S}$  content. Methyl mercaptan content was not significantly influenced by the formulation of the product. Omission of egg white decreased free  $\text{NH}_3$  concn.; omission of yolk had no such effect. Omission of yolk or corn oil reduced levels of unsaturated carbonyls; omission of albumen or dried skim milk increased unsaturated carbonyls content. Omission of all constituents except liquid egg reduced unsaturated carbonyls content. Omission of egg white resulted in a 542% increase in saturated carbonyls concn. The  $\text{H}_2\text{S}$  and carbonyls may react, reducing the concn. of both. Cooked egg white had a stronger carbonyl-decreasing capacity than raw egg white. Dicarbonyls were the major class decreased by egg white; however, egg white was the major source of monocarbonyls. Yolk was an important source of generation of lower 2-enals and 2,4-dienals during cooking. AJDW

### 40

Egg de-hydration plant. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture]

Capetillo, G. O.

pp. 15–23 (1981) [En] [Anhydro A/S, Soborg, Denmark]

Manufacture of dehydrated egg products is discussed with reference to: location of the plant in relation to sources of eggs; plant layout; product range; reception and storage of shell eggs; raw material quality; candling; washing; breaking and separation; storage of the liquid egg; pasteurization; sanitary conditions; spray-drier design; and separation and cooling of the powdered product. Flow diagrams are given. AJDW

### 41

Determination of  $\beta$ -sitosterol in meats, soya and other protein products.

Agater, I. B.; Llewellyn, J. W.

*Food Chemistry* 8 (1) 43–49 (1982) [3 ref. En] [Lab. of the Gov. Chem., Cornwall House, Stamford Street, London SE1 9NQ, UK]

$\beta$ -Sitosterol was shown to be present in a range of soybean products, egg powder, several meats and wheat flour. Sterols were isolated and  $\beta$ -sitosterol in the resultant mixture was determined by GLC. Repeated analyses of individual samples displayed wide variance; the soybean products exhibited considerable interproduct variation in  $\beta$ -sitosterol content. A level of  $\beta$ -sitosterol similar to that found in soy products was found in wheat flour and somewhat lower levels in beef, pork, lamb and egg powder. The method cannot be used for the quantitative detn. of soy in meat products, but may be of some diagnostic value. AS

### 42

[Effect of sucrose on growth of *Staphylococcus aureus* and enterotoxin production in egg custard.]

Igarashi, H.; Shingaki, M.; Takahashi, M.; Ushioda, H.; Terayama, T.; Sakai, S.

*Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 31 (1) 122–126 (1980) [Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo 160, Japan]

When sucrose was added to egg custard at a concn. of 30%, growth of *Staphylococcus aureus* strains 243 and FRI-361 (producing enterotoxins B and C resp.) was partially inhibited at 25°C and production of enterotoxin B during incubation at 25°C for 48 h was reduced. [From En summ.] MEG

### 43

Sensory quality and energy use for scrambled eggs and beef patties heated in institutional microwave and convection ovens.

Cremer, M. L.

*Journal of Food Science* 47 (3) 871–874 (1982) [En] [Ohio State Univ., 1787 Neil Ave., Columbus, Ohio 43210, USA]

Scrambled eggs (96 portions) and beef patties (96 portions) were heated in institutional microwave and convection ovens to determine energy use in heating and sensory quality of food. For both products, significantly ( $P < 0.01$ ) more energy (BTU) was used for heating in the convection than in the microwave oven, and respective amounts (BTU) were 28 658.7 and 9385.7 for eggs; 31 313.3 and 9365.0 for beef patties. All scores for sensory quality were significantly ( $P < 0.01$ ) higher for eggs heated in the microwave than in the convection oven, but for beef patties, scores were higher for all characteristics and significantly ( $P < 0.01$ ) higher for appearance, flavour, and general acceptability after heating in the convection rather than the microwave oven. IFT

44

**Assessment of egg flavor (odor) quality by unconventional gas chromatography.**

Rayner, E. T.; Dupuy, H. P.; Legendre, M. G.; Schuller, W. H.; Holbrook, D. M.  
*Poultry Science* 59 (10) 2348-2351 (1980) [9 ref. En]  
 [S. Reg. Res. Cent., New Orleans, Louisiana 70179, USA]

A direct GLC-MS method for analysis of flavour volatiles is described [see FSTA (1974) 6 2N56, (1977) 9 4N218 & (1978) 10 5N225]. Application of this method to assessment of flavour and odour quality of liquid egg products is considered, with reference to studies on samples of 'satisfactory', 'slightly sour' and 'sour' liquid egg. Chromatograms of 'sour' and 'satisfactory' samples are given. 'Slightly sour' liquid egg had higher concn. of ethanol, methyl propanol, diacetyl and 3-methylbutanal; 3-hydroxy-2-butanone is present in slightly sour egg, but not in satisfactory liquid egg. Sour egg shows a further increase in ethanol and 3-hydroxy-2-butanone concn., whereas methyl propanol and 3-methylbutanal concn. are markedly lower than in normal samples.

AJDW

45

**Egg white substitute material.**

Olsen, H. A. S. (Novo Industri A/S)

*UK Patent Application* 2 076 825A (1981) [En]

Egg white substitute is prepared from defatted soybean by extraction with an aqueous base, ultrafiltration and proteolytic hydrolysis. The product has good whipping and emulsifying properties. IIT

46

**Method and apparatus for peeling of shells of boiled eggs.**

Fujii, N. (QP Corp.)

*United States Patent* 4 311 089 (1982) [En]

Apparatus is described for continuously peeling the shells of boiled eggs. Eggs are passed through an eccentrically rotating cylinder through which is moving a stream of water; the boiled eggs collide with the cylinder inner surface to fragment the shell but leave the membrane intact. The membrane is then broken; and the boiled eggs are then removed from the shells. RAW

47

**Method of manufacturing a hard- or soft-boiled egg.**

Toda, S.

*British Patent* 1 604 151 (1981) [En]

Process is described in which a seasoned raw egg is packaged in an egg shaped foil container and heated to yield a soft or hard boiled packaged product. The packaged egg can then be sold ready-to-eat. RAW

48

**Attempts to determine egg content in pastry products using the NIR technique.**

Kafka, K. J.; Kulcsar, F.

*Acta Alimentaria* 11 (1) 47-64 (1982) [23 ref. En]  
 [Central Food Res. Inst., H-1022 Budapest, Herman Otto ut 15, Hungary]

Use of near IR (NIR) reflectance measurements to determine the egg content of pasta was investigated under laboratory conditions using a Neotec 6450 Research Composition Analyzer. Reflectance spectra were recorded between 1100 and 2500 nm, the spectrum of each sample being the average of 50 scans. Pasta samples were prepared containing 0, 2, 4 and 6 eggs/kg dry wt. and were analysed for fat and protein content by standard methods. Regression analysis was used to determine characteristic wavelengths for egg, protein and fat content of pasta samples. Accuracy was improved by choosing more than 1 characteristic wavelength; using measurements at 1650 and 1724 nm egg content could be calculated with an s.e. of 0.166. Correlation coeff. between egg content determined by standard method and that determined from NIR measurement at these 2 wavelengths was 0.998. The regression equation relating egg content to NIR measurements is given. Characteristic wavelengths for fat and protein content were the same as for egg content; s.e. of measurements were 0.006 and 0.067, resp. It was assumed that NIR measurements are related to fat content and that increasing egg content of pasta increases fat and protein content simultaneously, but with bigger % increases in fat. Studies are in progress of samples in which fat and protein content vary independently. It was also found that by taking the 1st derivative of the spectra, the accuracy of detn. of egg content could be improved, e.g. with 3 characteristic wavelengths s.e. of estimate was 0.051, correlation coeff. with standard method of detn. 1.00. DIH

49

**[Characterization of *Staphylococcus aureus* isolated from Kinshi tamago, a frozen omelette product.]**

Niwayama, K.; Murauchi, H.; Igarashi, H.;

Shinohara, T.; Yamagishi, H.; Kato, K.

*Annual Report of Tokyo Metropolitan Research Laboratory of Public Health* 31 (1) 127-131 (1980)

[18 ref. Ja, en] [Tokyo Metropolitan Res. Lab. of Public Health, 24-1, Hyakunincho 3 chome, Shinjuku-ku, Tokyo, 160 Japan]

6 lots of frozen Kinshi tamago (a thin-sliced omelette product) produced by a Kyoto factory that had been implicated in a *S. aureus* food poisoning outbreak were analysed microbiologically. 4 of the 6 lots contained *S. aureus* at levels of  $6.0 \times 10^2$ - $7.0 \times 10^4$ /g (22 strains were isolated). None of the samples contained enterotoxin but 6 strains (from 3 of the lots) were capable of producing 2 or 3 types of enterotoxin (A, B and C). No sample contained thermostable nuclease, although all strains were capable of producing it. On the basis of haemolysin production and drug resistance characteristics it was concluded that the *S. aureus* strains contaminating the egg product were of human origin. [From En summ.] DIH

50

**Functional properties and food applications of  
rapeseed protein concentrate.**

Thompson, L. U.; Liu, R. F. K.; Jones, J. D.

*Journal of Food Science* 47 (4) 1175-1180 (1982) [En]

[Dep. of Nutr. & Food Sci., Univ. of Toronto, Toronto,  
Ontario, Canada M5S 1A8]

Rapeseed protein concentrate (RC), prepared with 2% hexametaphosphate, was tested for its functionality and performance in some foods. The RC had good N solubility, fat absorption, emulsification, and whipping capacities but poor water absorption and gelling properties. It increased the emulsion stability, and protein but lowered the fat content of wieners. It also increased the cooking yield, reduced the shrinkage and tenderized meat patties. Results were similar to soybean isolate except for the poorer colour and flavour. The cooking yield of RC supplemented wieners was less than the all-meat control and soybean-supplemented wieners. A 9% RC dispersion mixed with an equal vol. of eggwhite produced a meringue of comparable stability and texture to that of eggwhite alone. IFT

51

**Composition of serum from cooked-frozen-thawed-reheated scrambled eggs at various pH levels.**

Feiser, G. E.; Cotterill, O. J.

*Journal of Food Science* 47 (4) 1333-1337 (1982) [En]

[Dep. of Food Sci. & Nutr., Univ. of Missouri, Columbia,  
Missouri 65211, USA]

The vol. of serum pressed from the cooked-frozen-thawed-reheated scrambled egg decreased as pH was increased from 6.0 to 7.0. Solids, protein and lipid levels were max. at pH 7.0. Ash and P contents decreased with increased pH. Na and K remained constant. Chloride concn. increased from pH 6.2 to 6.8. Fe had max. levels at pH 6.2 and 6.8-7.2. The lipid and P levels in the serum were very low when compared to those in the original liquid whole egg. Ovomacroglobulin, lipovitellin and some of the globulins and livetins were absent in the electrophoretograms of the serum. Also, a band appeared in the ovomucoid area which was not normally present in uncooked egg. IFT

# EGG SHELLS

## 1

### Effect of cage dimension and feeding regimes on the performance of chickens laying brown eggs.

Muir, F. V.; Gerry, R. W.; Hawes, R. O.

*Research in the Life Sciences* 27 (1) 8pp. (1980) [7 ref. En] [Dep. of Anim. & Vet. Sci., Univ. of Maine, Orono, Maine 04469, USA]

The influence of restricted feeding initiated at 22 or 31 wk of age on the performance of Harco Red x Rock sex-linked hens housed in conventional or reverse laying cages was investigated. Reverse cages are those with the long dimension parallel to the feed trough, unlike conventional cages. Measurements of egg traits revealed no significant treatment differences in egg size or Haugh units at 42, 59 or 72 wk, or in shell thickness at 59 or 72 wk, but at 42 wk mean shell thickness was significantly greater for hens housed 4 birds/reverse cage on restricted feeding than in those housed 2 or 3/conventional cage on full feed. Egg shell damage was less for birds housed 3-4 in reverse cages than those housed 2-3 in conventional cages. AL

## 2

### Shell quality studies in three body weight groups of the Lohmann Superbrown layers.

Hussain, S. A.; Mukherjee, T. K.; Wolf, M.; Horst, P. *Malaysian Applied Biology* 7 (2) 111-119 (1978)

[27 ref. En, my] [Dep. of Genetics & Cellular Biol., Univ. of Malaya, Kuala Lumpur, Malaya]

Periodic shell quality studies were carried out on eggs laid by 284 light, 256 medium and 246 heavy hens of the Lohmann Superbrown hybrid. Egg wt., sp. gr., breaking strength, shell wt., and % shell were determined; results are tabulated. The lighter birds produced eggs of superior shell quality, so work should be concentrated on improving the egg wt. of these hens, as these birds are good producers suitable to the Malaysian industry. LH

## 3

### Scanning electron microscopy of fractures in eggshells subjected to the puncture test.

Stevenson, I. L.; Voisey, P. W.; Hamilton, R. M. G.

*Poultry Science* 60 (1) 89-97 (1981) [24 ref. En] [Chem. & Biol. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ontario K1A 0C6, Canada]

Eggshells were subjected to puncture tests and the microstructure of the resulting fractures examined by scanning electron microscopy. The shell material fractured in a manner typical of brittle materials where a cone of material is forced inwards. According to established theory the fractures are due to tensile stress. This explains why the forces required to puncture the egg and to fracture the egg by quasistatic compression between flat surfaces are related; both tests respond to the resistance of the shell material to tensile fracture. Tests using a punch and die to impose shear fractures showed that the shear strength of the shell is greater than the tensile value. Furthermore, the shear strength of the shell material is directionally dependent with the shell showing greater resistance when punched from the outside. The findings show that comparative studies using the eggshell puncture test must be carefully interpreted, since unknown and confounded factors affect the puncture force. AS

## 4

### Nondestructive evaluation of the strength of eggs by holography.

Vikram, C. S.; Vedam, K.; Buss, E. G.

*Poultry Science* 59 (10) 2342-2347 (1980) [6 ref. En] [Materials Res. Lab., Pennsylvania State Univ., Univ. Park, Pennsylvania 16802, USA]

The feasibility of employing holographic interferometry to determine and compare the strengths of egg shells without breaking the egg is discussed. The necessary experimental set up is described and the theory to determine the mechanical deformation from the results is outlined. Experimental results are presented for 3 eggs of known order of shell strengths, 7.9, 9.4 and 10.4% shell (dry shell/fresh whole egg); fewer horizontal fringes occurred with increasing % shell. Mechanical deformations of these shells against vertical base loads of 113.5 and 303.0 g were determined, and fewer fringes appeared with the heavier load. Finally, the effect of temp. 20°C, 30°C, and 40°C on one of the shells was studied. It is found that the number of fringes increased as the temp. was increased, indicating a decrease in the strength of the egg shell with increasing temp. AS

## 5

### [Bacterial flora of fresh eggs, and eggs stored for 4 weeks.]

Gesche, E.; Schuler, A. M.

*Alimentos* 4 (3) 11-13 (1979) [9 ref. Es, en] [Inst. de Higiene & Salud Publica, Univ. Austral, Valdivia, Chile]

Studies were conducted on the bacteriological quality of (i) fresh eggs and (ii) eggs stored for 4 wk at ambient temp. No positive results were obtained from albumen or yolk samples. Fresh eggs had an average log count/total shell surface of 3.75 (range 3.45-4.14) vs. an average of 3.45 (range 3.10-4.23) for the stored eggs. % relative importance of various genera and groups of bacteria on the shell surface of fresh eggs were:

*Micrococcus* 61.31; *Staphylococcus* 31.16; *Bacillus* 5.53; *Pseudomonas* 0; *Enterobacteriaceae* 0.50; *Acinetobacter* 1.00; and *Xanthomonas* 0.50.

Corresponding values for the stored eggs were 39.20, 24.12, 29.15, 3.51, 2.01, 2.01 and 0. Gram-negative bacteria comprised 2.00% of the shell flora of fresh eggs, vs. 7.53% for stored eggs. AJDW

## 6

### [Studies on a method for measuring eggshell strength under compressive force.]

Kurimatsu, Y.; Iwai, T.; Yoshida, S.

*Scientific Reports of the Kyoto Prefectural University, Agriculture* [Kyoto-furitsu Daigaku Gakujutsu Hokoku, Nogaku] 32, 56-65 (1980) [46 ref. Ja, en]

1040 eggs collected from 4 commercial laying strains were tested for strength using (i) the Tensilon UTM-4L testing machine, and (ii) a Fujihira egg shell strength tester. The compressive force along the major and minor axes of each egg was measured by (i) and (ii); sp. gr. of eggs was measured in various saline solutions; average shell thickness at 3 points on the equatorial region was determined using a vice caliper. All data were subjected to correlation and regression analysis and results are discussed. Shell strength was lower when measured by (ii) than by (i). [From Eng. Transl. of Sci. Rep. Kyoto Prefectural Univ. Agriculture, 32, 56-65 (1980)]

## 7

[**Interrelation of shell membrane characteristics and shell strength characteristics of hens' eggs.**]

**Abhängigkeit zwischen einigen Charakteristika der Schalenmembran und Kriterien der Stabilität von Hühnereiern.**

Schramm, R.; Kraatz, B.

*Archiv für Tierzucht* 24 (6) 541-548 (1981) [7 ref. De, en, ru] [Sektion Tierproduktion & Veterinärmed., Humboldt-Univ., 1040 Berlin]

Studies were conducted on a total of 327 eggs, shell characteristics (width, length, shape index, thickness, breaking strength) and shell membrane characteristics (thickness at 2 locations, tensile strength, elongation characteristics) being determined. Tables of results are given, together with correlations and regressions.

Significant correlations were observed between various shell membrane and shell characteristics. It is concluded that the shell membrane contributes to the shell stability of eggs. AJDW

## 8

[**Studies on the improvement of poultry egg quality. V. Relation between egg shell quality and production status and time and interval length of oviposition.**]

Tominaga, K.; Inoue, Y.; Kataoka, T.

*Bulletin of Hyogo Prefectural Experiment Station of Animal Husbandry* No. 16, 123-127 (1979) [29 ref. Ja]

Eggs from 300 White Leghorn (WL) hens (80 wk old) and 300 local crossbred hens (85 wk old), given the same commercial layers diet, were collected 4 times daily on 2 consecutive days. For crossbred hens, the first clutch of eggs from hens laying only on the 2nd day had stronger and thicker shells than the middle clutch of eggs from hens laying on both days ( $P < 0.05$ ); eggs in the last clutch from hens laying on the 1st day only had thin shells of intermediate strength. Differences were not significant for WL hens. For both breeds, eggs collected in the afternoon (2 or 4 p.m.) had thicker, and stronger ( $P < 0.05$ ) shells than those collected in the morning (10 a. m. or 12 p. m.). For hens laying on both days, egg shell strength was greatest when the interval between eggs (24-30 h) was 28 h ( $P < 0.05$ ); shell thickness was not significantly affected by laying interval. Eggs from crossbred hens had significantly stronger and thicker shells than eggs from WL hens. CIH

## 9

[**The effect of dietary calcium on feed consumption in the laying hen.** (In 'Proceedings, 1980 Georgia Nutrition Conference for the Feed Industry' [see FSTA (1982) 14 8G512]) [Lecture]

Charles, O. W.

pp. 68-78 (1980) [34 ref. En] [Poultry Sci. Lab., Riverbend Res. Cent., Univ. of Georgia, Athens, Georgia 30602, USA]

120 single-comb White Leghorn hens were assigned to a basal corn-soy diet with 2.58 or 3.55% Ca, either as ground limestone (GL) or  $\frac{2}{3}$  oyster shell (OS) +  $\frac{1}{3}$  GL. Diets were analysed for composition, and the experiment was conducted over 12 replicate 28-day

laying periods. All eggs collected at 8.00 a.m. and 3.30 p.m. on the last 3 days of each period were investigated for egg shell quality. Results are tabulated. Sp. gr. of eggs was significantly correlated to Instron breaking strength. Time of oviposition as affecting egg shell quality was studied, and eggs produced in the afternoon had higher breaking strength than those produced in the morning. Addition of OS to low Ca diets resulted in egg shell quality equivalent to that of high Ca diets based on GL. LH

## 10

[**Effect of dietary protein on egg shell quality.** (In 'Proceedings, 1981 Georgia Nutrition Conference for the Feed Industry' [see FSTA (1982) 14 8G514]) [Lecture]

Britton, W. M.

pp. 28-31 (1981) [4 ref. En] [Dep. of Poultry Sci., Univ. of Georgia, Athens, Georgia 30602, USA]

2 experiments were conducted. In the 1st, 2 groups of 40 hens each were fed (i) a control diet with 16.5% protein, or (ii) a diet with 12.0% protein for 4 wk. After this (i) and (ii), resp. gave eggs of the following quality: egg wt. (g) 63.5 and 60.5; shell wt. (g) 5.6 and 5.2; shell wt./egg wt. (%) 8.8 and 8.6; shell deformation ( $\mu\text{m} \times 10^{-2}$ ) 2.5 and 2.7; breaking strength (kg) 2.7 and 2.8; sp. gr. 1.086 and 1.083. In the 2nd study 74-wk old laying hens, which had been selected for their ability to lay eggs with good (GD) or poor (PR) shell quality (60 hens/group), were fed (iii) a control diet containing 17.3% protein, and (iv) a diet with 10.9% protein. In (iii) and (iv), resp. egg wt. was 60.2 and 53.0 g in GD vs. 59.0 and 53.1 in PR; shell wt. was 5.0 and 4.2 g in GD vs. 4.4 and 3.8 in PR; % shell was 8.3 and 7.9 in GD vs. 7.4 and 7.2 in PR; shell deformation was 24 and 24 ( $\mu\text{m} \times 10^{-2}$ ) in GD vs. 3.2 and 3.0 in PR; breaking strength was 2.7 and 2.7 kg in GD vs. 2.3 and 2.3 in PR. Thus reduced dietary protein caused decreased egg size, but did not affect egg shell quality very significantly. LH

## 11

[**Influence of stabilized 25-hydroxycholecalciferol (25-HCC) on the performance of laying hens and on the eggs shell quality.**

Janssen, W. M. M. A.; Versteegh, H. A. J.; Schagen, P. J. W. van

*Archiv für Geflügelkunde* 45 (5) 194-200 (1981) [20 ref. En, de, fr, ru] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, Beekbergen, Netherlands]

1656 Brown and 552 White Leghorn hens were used in a study on effects of dietary vitamin D source (vitamin D<sub>3</sub> or 25-hydroxycholecalciferol), vitamin D level (25 or 50 mcg/kg) and zinc-bacitracin level (0, 20, 40, 60, 80 or 100 mg/kg). Eggs were evaluated after up to 82 wk on the experimental diets, egg wt., egg sp. gr., shell wt., shell thickness and shell deformation value being determined. Treatment effects were generally small. There were tendencies for vitamin D<sub>3</sub> to give slightly higher egg wt., and thicker egg shell (of brown eggs only) than 25-hydroxycholecalciferol. AJDW

## 12

**The effect of ambient air moisture and temperature on egg shell breaking strength.**

Lott, B. D.; Reece, F. N.

*Poultry Science* 60 (1) 142-144 (1981) [7 ref. En]  
[USDA, Sci. & Education Admin., Agric. Res., S. Cent. Poultry Res. Lab., Mississippi 39762, USA]

Batches of eggs were held for 24 h after laying, then held for at least 20 h at 4.4° or 32.0°C, at either 40% RH or dew point 1.7°C (RH 83% at 4.4°C, RH 15% at 32°C); shell strength was then determined, using an Instron Model TM Universal Testing Machine, with a loading rate of 2.0 cm/min. Tables and a graph of results are given. The results show that, at constant dewpoint, i.e. moisture level in the ambient air, temp. had little effect on breaking strength; however, at constant RH, breaking strength decreased with increasing temp.  
AJDW

## 13

**Effect of temperature, pH, and detergent on survival of bacteria associated with shell eggs.**

Kinner, J. A.; Moats, W. A.

*Poultry Science* 60 (4) 761-767 (1981) [14 ref. En]  
[Ruminant Nutr. Lab., USDA, Sci. & Education Administration, ASI, BARC-East, Beltsville, Maryland 20705, USA]

Survival was studied of shell egg related microorganisms that were subjected to various combinations of water temp., pH, and the presence of egg-washing detergents. Numbers of *Salmonella typhimurium* in buffered tryptic soy broth (BTSB) increased over a 7-h period at pH 7 and 8 in water temp. 35°, 40°, and 45°C. At pH 9 and 45°C, counts gradually decreased. At pH 10 and 11 counts always decreased, sometimes to 0, regardless of temp. At 50° and 55°C, counts always decreased, sometimes to 0, regardless of pH. In commercial egg washing detergent (pH 11) at 50°C, survival of *Salmonella*, *Citrobacter*, *Enterobacter*, *Proteus*, and *Klebsiella* strains ranged from 0 to 90 s during several replicates. Survival times of most were extended somewhat in the presence of 1.0% suspended whole egg solids (e.g., *Klebsiella*, 3 min). Strains of *Alcaligenes*, *Flavobacterium*, and *Pseudomonas* demonstrated survival trends similar to those of the enterics: *Flavobacterium* survived the longest, almost 4 min either with or without egg material in the detergent solution. *Pseudomonas* and *Escherichia coli* were killed off almost instantaneously under the same conditions. Survival of *Staphylococcus aureus* was adversely affected by the presence of the detergent (12 min) but was somewhat protected by the egg material (37 min). *Streptococcus faecalis* was virtually unaffected in either case, surviving up to 2.5 h. AS

## 14

**The influence of nutrition on egg shell quality.**

I. Calcium.

Harms, R. H.

*Feedstuffs* 54 (18) 25-27 (1982) [10 ref. En] [Dep. of Poultry Sci., Univ. of Florida, Gainesville, Florida, USA]

Factors influencing eggshell quality, thickness etc. are discussed, with special reference to Ca. Variables considered include: diseases; genetic factors; stress; physiological factors; environmental effects; Ca level in the diet; Ca source; particle size of dietary Ca; and effects of ascorbic acid. AJDW

## 15

[Factors affecting egg weight and shell quality.]

Han, I. K.; Choi, Y. J.

*Technical Bulletin, Korean Society of Animal Nutrition & Feedstuffs* No. 4, 123-134 (1980) [25 ref. Ko] [Coll. of Agric., Seoul National Univ., Seoul, S. Korea]

Factors influencing the wt. and shell quality of hens' eggs are reviewed, including dietary protein level, amino acid supplements, energy restriction, hen age and strain, vitamin C, vitamin D<sub>3</sub>, environmental temp., lighting regime, time of oviposition, dietary Ca level, and water deprivation. AJDW

## 16

**Physical characteristics of intact and cracked eggs.**

Belyavin, C. G.; Boorman, K. N.

*British Poultry Science* 21 (1) 9-15 (1981) [10 ref. En]  
[Harper Adams Poultry Husbandry Exp. Unit, Edgmond, Newport, Shropshire TF10 8HY, UK]

6 egg samples, comprising equal numbers of intact and cracked eggs, were collected from 3 flocks of hybrid layer hens. Cracks were classified as hole, star or straight and the wt., shape, shell colour and sp. gr. of all the eggs were measured. Shell thickness and dry shell wt. were also recorded for a max. of 10 intact and 10 cracked shells from each sample. The largest proportion of cracks were found to be holes. Differences in mean egg wt. and shape of intact and cracked eggs within each sample were inconsistent. Mean shell colour was darker for the intact brown eggs than for the cracked ones. For all the samples, mean egg sp. gr., shell thickness and dry shell wt. were higher for the intact eggs. The difference in egg sp. gr. was significant ( $P < 0.05$ ) for all samples. Holes occurred in eggs of lower mean wt. but with better quality shells than those in which star or straight cracks occurred.  
AS

## 17

**The influence of nutrition on eggshell quality.**

II. Phosphorus.

Harms, R. H.

*Feedstuffs* 54 (19) 25-26 (1982) [9 ref. En] [Dep. of Poultry Sci., Univ. of Florida, Gainesville, Florida 32601, USA]

The effect of P nutrition of hens on the shell quality of eggs is discussed with reference to: quantity of P in eggshells; adverse effects of excess dietary P; effects of P nutrition on egg sp. gr.; diurnal changes in the P requirement of hens; and metabolism of P by hens. [See FSTA (1982) 14 9Q165 for part I.] AJDW

**The influence of nutrition on egg shell quality.****III. Electrolyte balance.**

Harms, R. H.

*Feedstuffs* 54 (20) 25-28 (1982) [14 ref. En][Dep. of  
Poultry Sci., Univ. of Florida, Gainesville, Florida 32601,  
USA]

The effect of cation/anion relationship on the shell quality of eggs is discussed, with reference to: ions of importance ( $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{NH}_4^+$ ,  $\text{H}^+$ ,  $\text{HPO}_4^{2-}$ ,  $\text{H}_2\text{PO}_4^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{HCO}_3^-$  and  $\text{Cl}^-$ ); changes in blood pH during shell formation; effects of  $\text{Na} + \text{K}/\text{Cl}$  ratio on egg sp. gr.; relation of egg sp. gr. to blood parameters; effect of dietary  $\text{NaHCO}_3$  on shell quality; and interaction of various ions in relation to shell quality.  
[See preceding abstr. for part II]. AJDW

# EGG WHITES

## 1

Separation of native and acylated egg white proteins with gel chromatography and DEAE-cellulose ion exchange.

Palladino, D. K.; Ball, H. R., Jr.; Swaisgood, H. E. *Journal of Food Science* 46 (3) 778-780 (1981) [9 ref. En] [Dep. of Food Sci., N. Carolina State Univ., 339A Schaub Hall, Raleigh, N. Carolina 27650, USA]

2 chromatographic techniques applied to the separation of native and acylated egg white are described. A modified DEAE-cellulose ion exchange method was developed, which reduced separation time and expense. Increases in net charge introduced by acylation with succinic or acetic anhydride changed the ionic state of the proteins, limiting their separation by ion-exchange chromatography. Using Sephadryl S-200, a gel chromatographic technique was developed which separated > 80% of the total succinylated egg white proteins; viz. ovomucin, ovalbumin, conalbumin, ovomacroglobulin, and lysozyme. Most proteins of native and acetylated egg white were separated with S-200 chromatography, but required rechromatography of the ovalbumin-conalbumin fractions for complete resolution. IFT

## 2

[Determination of the polyamines of egg white and their role in the Maillard reaction.] [Thesis; Determinacao das poliaminas da clara de ovo e sua participacao na reacao Maillard, 55pp., Pt] Silvestre, M. P. C.

*Informativo Anual, Faculdade de Engenharia de Alimentos e Agricola, Universidad Estadual de Campinas* No. 8, 40-42 (1980) [Pt, En]

White of hen's egg was dialysed, freeze-dried and stored with glucose (protein/hexose 3:2 w/w) at 37°C, 68% RH for 0, 5, 10, 20 and 30 days, after which the mixtures were dialysed, freeze-dried, hydrolysed in 6N HCl, and the polyamines were extracted in n-butanol and determined by TLC. Three main polyamines were identified: spermidine, spermine and putrescine (27.1, 13.9 and 11.6 µg/g dry albumin, resp., after 0 days, decreasing to 13.7, 8.7 and 6.6 after 5 days and to 3.2, 1.4 and 2.1 after 30 days). Putrescine (free base) showed a higher rate of disappearance when the egg white was stored with glucose compared with loss when stored alone. It was concluded that loss of nutritive value was more a consequence of loss of polyamines than of available lysine. KME

## 3

[Stability and stabilization of hens' egg albumen proteins in relation to thermal stabilization technique.]

Palic, A.; Mihanovic, B.

*Hrana i Ishrana* 21 (5/6) 137-140 (1980) [9 ref. Sh, en] [Tehnoloski Fak., Zagreb, Yugoslavia]

Effects of stabilization of egg albumen proteins by addition of  $Fe^{3+}$ ,  $Zn^{2+}$ ,  $Cu^{2+}$  or  $Al^{3+}$  before pasteurization at 63°C for 3 min were investigated in studies on albumen and isolated conalbumin. The pasteurized samples were evaluated visually, electrophoretically and viscosimetrically.  $Al^{3+}$  was found to give the best protection against thermal coagulation of proteins. IN

## 4

Zone electrophoresis in open-tubular glass capillaries. Preliminary data on performance.

Jorgensen, J. W.; DeArman Lukacs, K.

*Journal of High Resolution Chromatography and Chromatography Communications* 4 (5) 230-231 (1981) [6 ref. En] [Univ. of N. Carolina, Chapel Hill, N. Carolina 27514, USA]

The theoretical basis and performance of zone electrophoresis in open-tubular glass capillaries, with detection by an 'on-column' fluorescence detector, are described and illustrated by separation of amino acid dansyl derivatives, and separation of fluorescamine-labelled peptides from a tryptic digest of reduced and carboxymethylated egg white lysozyme. RM

## 5

A comparative study of aggregated and disaggregated ovomucin during egg white thinning.

Kato, A.; Ogata, S.; Matsudomi, N.; Kobayashi, K.

*Journal of Agricultural and Food Chemistry* 29 (4) 821-823 (1981) [17 ref. En] [Dep. of Agric. Chem., Yamaguchi Univ., Yamaguchi, Japan]

A definite amount of aggregated ovomucin, 0.05 g/100 ml of egg white, remained insoluble during storage of egg white from 20 to 60 days. The sialic acid content in disaggregated ovomucin obtained by gel filtration on Sepharose 4B of the supernatant of stored egg white increased during storage. The ovomucin elution pattern on Sepharose 4B of thinned egg white obtained after a 20-day storage was similar to that of fresh thick white homogenized with barbital buffer, pH 8.6, rather than that of fresh thick white in the presence of 0.01M mercaptoethanol. These results suggest that noncovalent disaggregation of ovomucin occurs during thinning without disulphide cleavage. AS

## 6

Lead in preserved duck eggs: field screening test and confirmation and quantitation by atomic absorption spectrophotometry and anodic stripping voltammetry.

Krinitz, B.; Tepedino, N.

*Journal of the Association of Official Analytical Chemists* 64 (4) 1014-1016 (1981) [6 ref. En] [FDA, 850 Third Avenue, Brooklyn, New York 11232, USA]

Analysis of preserved duck eggs in this laboratory by acid digestion and AAS has shown that addition of lead salts to the egg coating to speed the preservation process results in Pb in the egg albumen and yolk. The Pb levels decrease as the Pb passes through successive membranes, i.e., the Pb level in the yolk is lower than that in the albumen. A method was developed for the field screening of preserved duck eggs for the presence of Pb in which a portion of the egg coating is shaken with 4% acetic acid, and the resulting solution is tested by a modification of the AOAC dithizone method. A quantitative method for laboratory confirmation of Pb in egg albumen and/or yolk was also developed in which Pb is determined by AAS or anodic stripping voltammetry after closed-system Teflon-cup digestion with nitric acid. AS

## 7

**A study of denaturation of egg white proteins during freezing using differential scanning calorimetry.**  
 Wootton, M.; Hong, N. T.; Pham Thi, H. L.  
*Journal of Food Science* 46 (5) 1336-1338 (1981) [En]  
 [School of Food Tech., Univ. of New South Wales,  
 PO Box 1, Kensington, NSW 2033, Australia]

Differential scanning calorimetry was used to determine the effect of freezing rate, thawing conditions, storage time, and storage temp. on the enthalpy of denaturation of frozen egg white. Viscosity, foam sp. gr. and foam instability of the product were also determined. Loss of enthalpy of denaturation was increased of slower freezing rates, higher thawing temp., higher storage temp., and longer storage times. Conalbumin suffered greater losses, and ovalbumin smaller losses, than egg white itself. Changes in egg white viscosity, foam sp. gr. and foam instability varied depending on the processing variable tested and had no clear-cut relation with losses in enthalpy of denaturation. IFT

## 10

**Response surface methodology for analysis of protein interactions in angel food cakes.**  
 Johnson, T. M.; Zabik, M. E.  
*Journal of Food Science* 46 (4) 1226-1230 (1981)  
 [10 ref. En] [Dep. of Food Sci. & Human Nutr., Michigan State Univ., East Lansing, Michigan 48824, USA]

Effects of variation in levels of various albumen proteins on foaming properties of protein solutions and angel food cake parameters were analysed by response surface methodology. A mixture experimental design was used to determine the protein treatment level combinations. Foaming index was positively affected by ovomucin, and interaction of ovomucin with globulins. Interactions of ovomucin with ovalbumin, lysozyme, ovomucoid, and conalbumin had a negative effect on foaming. Positive effects on cake vol. were observed for ovomucin, lysozyme and ovalbumin. Interactions of ovomucin with ovalbumin, globulins, and ovomucoid, as well as lysozyme with globulins, ovomucoid, conalbumin, and ovalbumin reduced cake vol. An angel food cake optimized for foaming and vol. can be prepared with ovomucin, lysozyme, and globulin levels of 0.2-1.0%, 0.0-1.8%, and 12.2-14.8%, resp. IFT

## 11

**Egg albumen proteins interactions in an angel food cake system.**  
 Johnson, T. M.; Zabik, M. E.  
*Journal of Food Science* 46 (4) 1231-1236 (1981)  
 [32 ref. En] [Dep. Food Sci. & Human Nutr., Michigan State Univ., East Lansing, Michigan 48824]

The foaming properties of 6 albumen proteins were tested singly and in combinations in an angel food cake system. Physicochemical characteristics and foamability of the protein solutions and vol. of cakes were determined. Solutions containing only globulins had good foaming properties and produced a large cake with excellent texture. Solutions of ovalbumin incorporated air after a long whip time and produced a large, coarse textured cake. Ovomucin, lysozyme, ovomucoid, and conalbumin had little or no foaming capacity. Association of ovomucin with globulins favoured foam formations, however, cake vol. was drastically reduced. Lysozyme, by complexing with ovomucin, depressed foaminess of the protein solution but considerably larger cakes were produced. Lack of heat coagulative properties of the protein film was primarily responsible for low cake vol. IFT

## 8

**[Effect of heating various proteins on their hydrolysis by proteolytic enzymes.] Einfluss einer Erwärmung verschiedener Eiweisse auf ihre Spaltbarkeit durch proteolytische Enzyme.**  
 Belikov, V. M.; Antonova, T. V.; Bezrukova, M. G.  
*Nahrung* 25 (1) 91-97 (1981) [39 ref. De, en, ru] [Inst. Elementoorganicheskikh Soedinenii AN SSSR, Moscow, USSR]

Samples of acid casein, freeze-dried egg white, food gelatin, edestin, freeze-dried oxidized bovine haemoglobin, a commercial soy preparation (Riston Beans), and a soluble protein fraction from this preparation were subjected to pepsin and pig pancreatin hydrolysis by the procedure of Khavat'yan et al. [FSTA (1975) 7 8G526] either without previous treatment or after heating as 1% solutions in 0.001N HCl at pH 2.2-2.4 for 30 min at 95°C. In general, in undenatured proteins (egg white, soy preparation) heating reduced pepsin hydrolysis to a much greater extent than in denatured proteins (gelatin, soy protein fraction, acid casein); and susceptibility to heat treatment increased with increase in cysteine content. SKK

## 9

**[Effects of addition of dried egg white in domestic sausage producing.]**  
 Umezawa, K.; Kimura, T.; Saito, Y.  
*Bulletin of the College of Agriculture and Veterinary Medicine, Nihon University [Nihon Daigaku Nojoigakubu Gakujutsu Kenkyu Hokoku]* No. 38, 155-159 (1981) [10 ref. Ja, en] [Lab. Food Manufacturing, Coll. Agric. & Vet. Med., Nihon Univ., Japan]

The effect of adding dried egg white on the texture of domestic sausages based on pork shoulder was studied. Various pH levels and cooking temp. were used, and it was found that water holding capacity was greatest at high concn. of dried egg white, as were tenderness and springiness. [From En summ.] LH

## 12

**Temperature-induced structural changes in chicken egg white ovomucoid.**  
 Matsuda, T.; Watanabe, K.; Sato, Y.  
*Agricultural and Biological Chemistry* 45 (7) 1609-1614 (1981) [22 ref. En] [Dep. of Food Sci. & Tech., Fac. of Agric., Nagoya Univ., Nagoya 464, Japan]

Temp.-induced structural changes in chicken egg white ovomucoid were investigated by circular dichroism (CD) and UV absorption. A major unfolding transition was brought about between 60° and 90°C with a rise in temp. as monitored by variations in CD at 222nm and absorbance at 287nm. Thermal transition was reversible when there was no prolonged exposure to heat. Van't Hoff plot for the

major unfolding process of the ovomucoid yielded the following thermodynamic parameters at pH 7.0 between 60° and 90°C:  $\Delta H_{vH} = 73$  kcal/mol at 74°C and  $\Delta S_{vH} = 209$  cal deg<sup>-1</sup> mol<sup>-1</sup> at 74°C, on the assumption of a two-state transition. The equilibrium CD spectra at various temp. suggested that the secondary structure change caused by heating from 20° to 60°C was qualitatively different from that from 60° to 90°C. By prolonged exposure to high temp. of 90°C, the reversible denatured state was slowly transformed into an irreversible denatured state. AS

### 13

#### Ultrastructural examination of egg albumen protein foams.

Johnson, T. M.; Zabik, M. E.

*Journal of Food Science* 46 (4) 1237-1240 (1981)  
[13 ref. En] [Dep. of Food Sci. & Human Nutr., Michigan State Univ., East Lansing, Michigan 48824, USA]

Transmission electron microscopy studies of protein foams revealed the presence of a layer of cross-linked polypeptides at the surface of the film enveloping an air inclusion. Scanning electron microscopic examination of a whipped solution with high levels of ovomucin and without lysozyme showed that the protein concentrated at the film surface and considerably decreased film continuity. The membrane appeared less cohesive in nature and draped fluidly over the torn edges. Inclusion of lysozyme improved the overall foam appearance. The effects of lysozyme on foaminess in the presence of ovomucin were apparently associated with formation of an ovomucin-lysozyme complex. This complex seemed to alter the viscous nature of ovomucin. IFT

### 14

#### Ion-exchange chromatographic determination of lysozyme in egg white.

Galyean, R. D.; Cotterill, O. J.

*Journal of Food Science* 46 (6) 1827-1828, 1834 (1981)  
[En] [Dep. of Food Sci. & Nutr., Univ. of Missouri, Columbia, Missouri 65211, USA]

Pure lysozyme solutions were chromatographed on diethylaminoethyl (DEAE) cellulose then monitored spectrophotometrically and by biological activity measurement. Although some biological activity was lost during chromatography, standard curves relating enzye content to chromatographic peak area corrected for this loss. The experimental system produced egg white lysozyme concn. which were comparable to literature values. The method of detn. could be used in the comparison of total enzyme concn. and active enzyme in experimental egg products. IFT

### 15

#### Heat-induced aggregation of egg white proteins as studied by vertical flat-sheet polyacrylamide gel electrophoresis.

Matsuda, T.; Watanabe, K.; Sato, Y.

*Journal of Food Science* 46 (6) 1829-1834 (1981) [En]  
[Dep. of Food Sci. & Tech., Nagoya Univ., Chikusa-ku, Nagoya 464, Japan]

Heat-induced aggregation of proteins in egg white was investigated by a vertical flat-sheet polyacrylamide gel electrophoretic method. The fractional and step-wise aggregation of egg white proteins was caused by heating. Even with a heating time of 120 min, ovalbumin and globulins A1 and A2 failed to aggregate in egg white (pH 7 and 9) at 70°C, and ovotransferrin and ovomucoid also did not aggregate in egg white at 60°C (pH 9) and 76°C (pH 7 and 9), resp. The ovoinhibitor was much more unstable than ovomucoid under heat-treatment, and the time dependency of heat-induced aggregation of flavoprotein was greater than those of the other proteins in egg white. IFT

### 16

#### Effect of Maillard reaction on some physical properties of ovalbumin.

Kato, Y.; Watanabe, K.; Sato, Y.

*Journal of Food Science* 46 (6) 1835-1839 (1981) [En]  
[Fac. of Agric., Nagoya Univ., Nagoya 464, Japan]

Ovalbumin freeze-dried with or without the addition of glucose was stored at 50°C and 65% RH to study the effect of the Maillard reaction on some physical properties of ovalbumin. In the early stage of the reaction in which ovalbumin-glucose complexes were formed, there were soluble types of monomer and aggregates of which  $\alpha$ -helix and available lysine contents were gradually decreased with length of storage and degree of aggregation. These compounds were characterized by properties possessing a marked resistance towards destruction of conformation and coagulation. With progress of the reaction, ovalbumin-glucose complexes changed to insoluble forms having higher particle wt. and breakdown products. IFT

### 17

#### [Deterioration of icing cream and its prevention.]

Yuki, E.; Ishikawa, Y.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 24 (12) 613-617 (1977) [6 ref. Ja, en] [Hiroshima Food Res. Inst., Hiroshima 730, Japan]

Deterioration of icing cream stored in the dark was largely due to hydrolysis, oxidative deterioration being negligible. Hydrolysis, which resulted in the development of a rancid odour and an increase in the acid value, was accelerated by adding egg white but inhibited by adding ethanol. Photo-oxidation occurred in icing cream held under fluorescent lamps; this oxidation resulted in the development of an unpleasant flavour and an increase in the peroxide value. Egg white was more effective than antioxidants (e.g. tocopherols, lecithin) in inhibiting photo-oxidation. [From En summ.] JA

### 18

#### [Use of protein hydrolysates as antioxidants in biscuits.]

Yamaguchi, N.; Naito, S.; Yokoo, Y.; Fujimaki, M.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (2) 56-59 (1980) [5 ref. Ja, en] [Food Res. Inst., Aichi Prefectural Government, 2-1, Shinpukuji-cho, Nishi-ku,

## Nagoya-shi, Aichi, Japan]

Studies were made of the antioxidant activities of egg white hydrolysed by HCl and of soybean protein hydrolysed by 7 protease preparations. The egg white hydrolysate (hydrolysis ratio 63.3%) inhibited autoxidation in lard-containing biscuits and also prolonged the induction period of lard. However, addition of >1% of the egg white hydrolysate resulted in browning of the biscuits. The hydrolysed soybean protein (hydrolysis ratio 5.2-21.6%) inhibited autoxidation in lard-containing biscuits, this inhibition being greatest with hydrolysis ratios of 19.4-21.6%. Browning occurred in biscuits containing 3% of the soybean hydrolysate but not in those containing 1%. [From En summ.] JA

## 19

## Incorporation of selenium into egg proteins after feeding selenomethionine or sodium selenite.

Latshaw, J. D.; Biggert, M. D.

*Poultry Science* 60 (6) 1309-1313 (1981) [9 ref. En]  
[Dep. of Poultry Sci., Ohio Agric. Res. & Development Cent., 674 W. Lane Avenue, Columbus, Ohio 43210, USA]

An experiment was conducted to determine if Se incorporation into egg proteins could be predicted on the basis of methionine or cystine content. Chickens in egg production were fed a basal diet or the basal diet supplemented with 0.2 or 0.4 p.p.m. Se from selenite or 0.2 or 0.4 p.p.m. Se from selenomethionine. Eggs were collected from each group after feeding the diet 18 days. All of the egg white proteins and yolk fractions prepared contained Se, and all of them increased in Se when more was fed. The increase in Se in egg white proteins after feeding selenite did not appear to be related to the cystine content of the proteins. However, the increase in Se in egg white proteins after feeding selenomethionine appeared to parallel the methionine content of the proteins. The Se level of yolk fractions was more closely related to the cystine content. Livetin fractions had the highest Se level, and low density fractions had the lowest. The data suggest that proteins synthesized in a tissue will have predictable amounts of Se but that proteins from different tissues will have different patterns of Se incorporation. AS

## 20

## Quality attributes of whole egg and albumen mixtures cooked by different methods.

Chen, T. C.; Hsu, S. Y.

*Journal of Food Science* 46 (4) 984-986 (1981) [14 ref. En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Whole egg and albumen mixtures were prepared and cooked by the following methods: pan scrambled in a double boiler; pan scrambled in a Teflon coated skillet; boil-in-bag in boiling water; and cook-in-bag in a microwave oven. Yields, weeping, and content of volatile flavour components in the cooked products were measured. Cooking yields were higher for those cooked by the boil-in-bag and cook-in-bag methods than for those pan scrambled. Regardless of cooking

method, yields of the albumen product were lower than the whole egg product. Products prepared by the cook-in-bag method had lower weeping %. The methods of cooking affected the major volatile contents of the products slightly. Double boiler scrambled whole egg product contained less H<sub>2</sub>S, NH<sub>3</sub> and total carbonyls than those prepared by other methods. IFT

## 21

## A chemical and biological study of acylated egg white.

King, A. J.; Ball, H. R.; Garlich, J. D.

*Journal of Food Science* 46 (4) 1107-1110 (1981) [28 ref. En] [Dep. of Food Sci., North Carolina State Univ., Raleigh, North Carolina 27650, USA]

Egg white treated with acetic and succinic anhydride was evaluated chemically and biologically. Lyophilized albumen contained 4.9% moisture and 82.0-85.8% protein. Acetylation blocked 64 and 68% total and epsilon amino groups, while succinylation blocked 52% total and 55% epsilon amino groups, resp. The in vitro multienzyme technique for evaluating protein digestibility indicated that untreated and treated egg white both were about 80% digestible. Wt gain of chicks fed acylated egg white as the sole source of dietary protein was significantly less than that of chicks fed the control. Chick mortality observed during the bioassays was attributed to a sodium and chloride imbalance in the diets. IFT

## 22

## Some physicochemical changes in quail egg white during storage.

Itoh, T.; Kobayashi, S.; Sugawara, H.; Adachi, S.

*Poultry Science* 60 (6) 1245-1249 (1981) [17 ref. En]  
[Dep. of Anim. Sci., Tohoku Univ., Tsutsumidori-Amamiyacho 1-1, 980 Sendai, Japan]

Physicochemical changes in quail egg white stored at 20° and 30°C were examined by several analytical techniques. The final pH attained in the quail egg albumen were slightly lower than those reported in chicken eggs. Polyacrylamide-gel electrophoretic patterns of albumen proteins became less clear and diffuse in the regions of ovalbumin and ovotransferrin after storage for >10 days at 30°C. Conversion of ovalbumin to S-ovalbumin, a more heat-stable form, was observed in the quail egg from the measurement of the changes in solubility and on the thermogram of differential thermal analysis. The ovalbumin modification progressed slightly slower in the quail egg than in the chicken egg. AS

## 23

## Effect of egg breakout temperature and other factors on residual albumen in the shell and on the yolk.

Maurer, A. J.; Wisniewski, G. D.

*Poultry Science* 60 (6) 1254-1258 (1981) [8 ref. En]  
[Dep. of Poultry Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Large or small eggs were stored at 4° or 13°C for 2, 7 or 14 days, then broken out at 4°, 13° or 22°C. Egg wt., albumen wt., residual albumen on the shell and the yolk.

yolk wt., shell wt. and Haugh score were determined. Generally, % albumen adhering to the shell and yolk was greater for small than for large eggs. Storage temp. did not significantly affect % adhering albumen. Storage for 14 days gave more adhering albumen and lower Haugh scores than storage for shorter periods. Breakout temp. did not significantly affect residual albumen in the shell. AS

## 24

Chromatographic separation of acylated egg white proteins and biophysical characterization of succinylated lysozyme and ovalbumin.

Palladino, D. K.

*Dissertation Abstracts International, B* 42 (2) 552: Order no. 8114603, 70pp. (1981) [En] [N. Carolina State Univ., Raleigh, N. Carolina 27607, USA]

The suitability of 2 chromatographic methods for separating the proteins of native and acylated egg white was examined. One method involving DEAE-cellulose ion exchange reduced separation time and costs. The increase in net charge caused by acylation with succinic or acetic anhydride changed the ionic state of the proteins and limited their separation by ion exchange. The second method, involving gel chromatography separation using Sephadryl S-200, separated >80% of the total succinylated egg white proteins; proteins of native and acylated egg white required rechromatography of the ovalbumin-conalbumin fractions with Sephadex G-100 for complete resolution. Effect of succinylation on ovalbumin and lysozyme conformation was examined. Results indicated that the increase in net negative charge accompanying succinylation causes significant conformational change which leads to improved functionality. JA

## 25

[Evaluation of methods of preserving protein products by dehydration.]

Brazhnikov, A. M.; Kamovnikov, B. P.

*Myasnaya Industriya SSSR* No. 10, 34-36 (1980) [6 ref. Ru] [Moskovskii Tekh. Inst. Myasnoi i Molochnoi Promyshlennosti, Moscow, USSR]

A series of mathematical formulae are given for calculating the effect of various drying processes (spray-, freeze-, vacuum) on the overall quality of dried protein products. Use of the formulae is illustrated by the examples of egg white, 18% fat quarg and beef. HBr

## 26

TI 59 calculator program for Haugh unit calculation.

Roush, W. B.

*Poultry Science* 60 (5) 1086-1088 (1981) [3 ref. En] [Dep. of Poultry Sci., Pennsylvania State Univ., Univ. Park, Pennsylvania 16802, USA]

A TI 59 calculator programme was written for Haugh unit score detn. of the albumen quality of eggs. The original equation developed by Haugh [*US Egg Poultry Magazine* (1937) 43, 552-555, 572-573] was incorporated into the programme. Use of the calculator programme gives an accurate and direct reading of the Haugh unit score. The programme was written so that the data could be recorded by means of an optional printer. AS

## 27

The use of the ultrafiltration process in the egg products industry. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Uijttenboogaart, T. G.

pp. 24-34 (1981) [11 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Beekbergen, Netherlands]

Studies on concentration of whole egg and egg white by ultrafiltration are described. 3 ultrafiltration modules were used: a Rhone-Poulenc plate & frame module, an Abcor spiral-wound module and a Wafilin tubular module. Aspects considered include effects of process parameters on mean permeate flux; effects of fermentation of the egg products (to eliminate glucose) on permeate flux; permeate composition; quality of concentrated and dried egg products; and economics of the process. For egg white, permeate flux was highest at high product velocity, high temp. and high pressure; for whole egg, product velocity and temp. were the main factors influencing permeate flux, effects of pressure being small. Running time had little effect on permeate flux. Fermentation tended to reduce permeate flux; fermentation after concentration is therefore recommended. Permeate from egg white and whole egg contained 1.1 and 1.2% dry solids, resp. Functional properties differed little between dried egg products prepared with and without pre-concentration by ultrafiltration. The economics of the process are generally favourable for egg white; for whole egg, there is currently little cost advantage or disadvantage in use of ultrafiltration. AJDW

## 28

Controlled fermentation of egg white by some

*Lactobacillus* strains. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120].) [Lecture]

Mulder, R. W. A. W.

pp. 41-47 (1981) [7 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Beekbergen, Netherlands]

Studies were conducted on use of *Lactobacillus brevis*, *L. casei*, *L. fermentum* and *L. plantarum* for removal of glucose from egg white by fermentation. 2 fermentation temp. (25° and 30°C) were tested. The fermented product was then dried in an experimental plate drier, and functional properties were evaluated. Bacteriological quality was evaluated at various stages of processing, and effects of pH (7.5, 8.7, 9.9) and holding in a 'hot room' for 8 days at 56°C on survival of the *Lactobacillus* spp. were evaluated. Tables and graphs of results are given. The higher fermentation temp. reduces fermentation time; in the cases of *L. fermentum* and *L. plantarum* it adversely affects functional properties. *Lactobacillus* spp. fermentation gave better results than enzymic fermentation, and similar results to *Streptococcus faecalis* fermentation. Considerable decreases in *Lactobacillus* counts occurred during hot-room storage of the dried product. Overall, *L. fermentum* gave the best results when fermentation was at 25°C; *L. brevis* gave the best results at 30°C. AJDW

## 29

### Rheological properties of two heat-induced protein gels.

Hickson, D. W.; Dill, C. W.; Morgan, R. G.; Sweat, V. E.; Suter, D. A.; Carpenter, Z. L.  
*Journal of Food Science* 47 (3) 783-785, 791 (1982)  
 [En] [Anim. Sci. Dep., Texas A&M Univ., College Station, Texas 77843, USA]

Rheological properties of heat-induced gels from egg albumen and bovine plasma proteins were measured using a mechanical loading device. Each protein was tested at 8% protein concn. and heated for 0-120 min at 80°C in an agitating water bath. After heating, the viscosity index, apparent elasticity and initial penetration force of the gels were evaluated. Bovine plasma protein dispersions exhibited a substantially higher viscosity index, apparent elasticity and initial penetration force than egg albumen gels. Bovine plasma proteins produced a gel structure which was strong and elastic. By comparison, heat-induced gels of egg albumen proteins were fragile and somewhat brittle. IFT

## 30

### An improved electronic gauge for measuring egg albumen height.

Buckley, D. J.; Amour, G. S.; Fairful, R. W.  
*Poultry Science* 60 (4) 777-780 (1981) [5 ref. En] [Eng. & Statistical Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ontario, Canada K1A 0C6]

An electronic egg albumen height gauge having improved long term reliability and accuracy is described. The height measurement accuracy is within  $\pm 0.02$  mm with a 4 digit display and within  $\pm 0.1$  mm with a 3 digit display. The repeatability of albumen measurements using the gauge in normal egg testing is 0.93. The advantages of the instrument over the standard manual micrometer for measuring egg albumen height are ease of use, reduced operator error, and increased measurement speed. Also, since the gauge has a digital output, overall measurement speed can be further increased by automatically entering each reading on an external data recording device. AS

## 31

Pancreatic enzymes, bile acids and cholesterol levels in mice fed raw or heated egg albumen.  
 Kirschenmann, S. G.; Schneeman, B. O.  
*Journal of Food Science* 47 (3) 714-715, 719 (1982)  
 [En] [Dep. of Nutr., Univ. of California, Davis, California 95616, USA]

## 32

### The "intrinsic" thermal conductivity of some wet proteins in relation to their average hydrophobicity: analyses on gels of egg-albumin, wheat gluten and milk casein.

Kong, J.; Miyawaki, O.; Nakamura, K.; Yano, T.  
*Agricultural and Biological Chemistry* 46 (3) 789-794 (1982) [20 ref. En] [Dep. of Agric. Chem., Univ. of Tokyo, Bunkyo-ku, Tokyo 113, Japan]

"Intrinsic" thermal conductivity values of unfrozen wet egg-albumin, wheat gluten and milk casein were determined on the basis of the series heat conduction model to be 0.238, 0.219 and 0.200 [W/m°C], resp. Corresponding values for frozen samples were 0.403, 0.315 and 0.273 [W/m°C], resp. "Intrinsic" thermal conductivity values of wet proteins determined in previous and present studies were between thermal conductivity values of water (or ice) and oils (or fats), in the reverse order of the average hydrophobicity values of proteins. AS

## 33

### [Measurement of hardening and softening properties of soybean protein-water suspension system.]

Umeya, J.; Yamauchi, F.; Shibasaki, K.  
*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (9) 459-463 (1980) [10 ref. Ja, en] [Dep. of Food Chem., Fac. of Agric., Tohoku Univ., Amamiyamachi, Sendai, Japan]

A coaxial cylinder viscometer with temp. and shear rate controllers was interfaced to a computer and used for cyclic temp. tests at constant shear, and cyclic shear tests in isothermal conditions, on soybean protein suspended in water. The former test was also carried out with egg albumen, casein and some commercial soybean protein isolates. [From En summ.] JRR

## 34

### Egg albumen proteins interactions in selected food systems.

Johnson, T. M.  
*Dissertation Abstracts International*, B 41 (12) 4441-4442: Order no. 8112097, 208pp. (1981) [En] [Michigan State Univ., East Lansing, Michigan 48824, USA]

Albumen protein functional properties and protein-protein interactions were studied in 2 food systems (angel food cake and custard). Globulins had good foaming properties and produced cake with high vol. and good texture; ovalbumin produced a coarse-textured cake of large vol.; conalbumin, lysozyme, ovomucin and ovomucoid alone had no foaming capacity. Ovomucin, lysozyme and globulins interacted to be important in foaminess and vol. of cakes, and ideal levels were set at 0.2-1.0%, 0.0-1.8%, and 12.2-14.8%, resp. Lysozyme, globulins and combinations thereof produced the firmest gels; ovomucin and ovomucoid showed no heat gelation abilities; heat stability was in the order of conalbumin < ovalbumin < globulins <

lysozyme, with denaturation transition temp. of 57.3, 71.5, 72.0 and 81.5°C, resp. Primary effect of protein-protein interactions in this food system was a denaturing action exerted by the less heat stable proteins over the more stable ones. Transmission electron microscopic and scanning electron microscopic examinations of foams and coagula were performed, and results are discussed. LH

## 35

**Sulfur amino acid stability, hydrogen peroxide treatment of casein, egg white, and soy isolate.**

Chang, K. C.; Marshall, H. F.; Satterlee, L. D.

*Journal of Food Science* 47 (4) 1181-1183 (1982) [En]

[Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

Egg white solids (EWS), soy protein isolate (SPI), and casein were treated with differing levels of  $H_2O_2$  at 10° and 90°C. Total and reactive cysteine/cystine (Cys), total methionine, methionine sulphoxide and sulphone contents were determined for all samples. At 40°C methionine in all samples was readily converted to its sulphoxide, with little sulphone or cysteic acid being formed. At 90°C Cys was rapidly converted to the stable cysteic acid and methionine to its stable sulphone form. The production of the less stable methionine sulphoxide at 90°C was minimal. Of the 3 proteins studied, the methionine and Cys residues in EWS were least stable under oxidizing conditions, whereas those present in SPI and casein were more stable. IFT

# EGG-YOLKS

## 1

[New calculation of the conversion factors for determination of phosphatide contents.]  
Neuberechnung der zur Bestimmung des Phosphatidgehalts benötigten Umrechnungsfaktoren.  
Pardun, H.

*Fette Seifen Anstrichmittel* 83 (6) 240-242 (1981)  
[11 ref. De][Anna-von-Cleve-Strasse 5, 4190 Kleve,  
Federal Republic of Germany]

The conventional conversion factor of 25.44, used for calculating phosphatide contents of fats from the P content, is critically examined. Tabulated data show that the factor is perfectly satisfactory for calculating phosphatidyl choline, phosphatidyl ethanolamine, phosphatidyl serine and phosphatidyl monoinositol, but less so for plant glycolipids which generally are ceramide phosphatides with lower P contents. Taking account of the phytoglycolipids, the conversion factor becomes 27.1 for soybean, 31.6 for groundnut and 24.6 for egg yolk lecithin, i.e. the conventional factor of 25.44 applies in the main only to egg yolk lecithin preparations. The new version of the DGF standard method ought to point out the variability of this factor. The factor 30 for acetone-insoluble portion (P content  $\times$  30) is also of uncertain accuracy; it is suggested that it should be increased to 31.5. RM

## 2

[Effects of oxidized fatty acids in mixed feeds on egg yolk carotenoids.) Auswirkungen oxiderter Fettsäuren des Mischfutters auf die Carotinoideinlagerung im Eiweiß. Oertel, M. L.; Hartfiel, W.

*Fette Seifen Anstrichmittel* 83 (4) 139-143 (1981)  
[13 ref. De, en][Inst. für Tierernährung, Univ. Bonn,  
Endenicher Allee 15, 5300 Bonn 1, Federal Republic of Germany]

The effects of the degree and rate of oxidation of fat/oil in mixed feeds on the deposition of carotenoids in (and hence the colour of) egg yolks were investigated. After depleting carotenoid reserves in the liver of laying hens, the animals were given mixed feeds containing fresh or oxidized soybean oil (peroxide number 210) with or without antioxidant supplements, or fats with varying contents of saturated and unsaturated fatty acids (refined soybean oil, coconut fat, lard, suet, cod liver oil). Results, shown graphically, revealed significant effect (an inverse relation) of fat oxidation on yolk colour, i.e. the colour decreased with increasing peroxide value and vice versa. Oils with high contents of unsaturated fatty acids reduced carotenoid accumulation in the yolks. Addition of antioxidants delayed the fat oxidation and hence the adverse effect on yolk colour. Poor quality basic feeds (e.g. tapioca meal with high lipoxygenase activity) can also affect peroxide formation, hence yolk colour. RM

## 3

A comparison of *Leucaena leucocephala* and grass meals as sources of yolk pigments in diets for laying hens.

Berry, S.; D'Mello, J. P. F.  
*Tropical Animal Production* 6 (2) 167-173 (1981)

[12 ref. En][Cent. of Tropical Vet. Med., Easter Bush,  
Roslin, Edinburgh, Midlothian, UK]

48 'Ross Tint' (White Leghorn  $\times$  Rhode Island Red) hens in their first yr of lay were used in trials on use of leaf meals as sources of yolk pigments. A low-pigment diet was fed (i) without added leaf meals; with Malawi *Leucaena leucocephala* meal added to give dihydroxyxanthophyll (DHX) concn. of (ii) 10 mg/kg or (iii) 20 mg/kg; (iv) with Bangkok *L. leucocephala* meal added to give DHX concn. of 10 mg/kg, or (v) with grass meal added to give a DHX concn. of 20 mg/kg. Hens received the experimental diets for 28 days. Eggs were collected daily, and the Roche colour fan scores and  $\beta$ -carotene equivalent contents of the yolks were determined. Graphs of results are given. Roche colour fan scores showed yolk colour intensity to increase with increasing DHX level. Within DHX level, the pigment source had little effect on yolk colour. A variant of diet (iii) in which coconut oil was substituted for groundnut oil in the basal diet gave slightly more intense yolk colour at the end of the trial than the other diets with 20 mg DHX/kg.  $\beta$ -Carotene equivalent values were highest for (v) and the (iii) variant with coconut oil, closely followed by the normal (iii) variant. The 2 diets with 10 mg DHX/kg gave lower  $\beta$ -carotene equivalent value (values for these 2 diets did not differ significantly). Diet (i) gave the lowest  $\beta$ -carotene equivalent values. Efficiency of utilization of pigments from the various sources studied is discussed, and differences in carotenoid composition are considered. AJDW

## 4

[Studies of changes in egg yolk components during heating.]

Tsutsui, T.; Obara, T.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (1) 7-13 (1980) [18 ref. Ja, en][Seitoku Junior Coll. of Nutr., 4-6, 1 Chome, Nishi-Shinkoiwa, Katsushika-ku, Tokyo, Japan]

The viscosity of egg yolk was increased by heating for 1.5 or 5 min at various temp. between 55° and 100°C, e.g. the viscosity was increased by 3-fold after 1.5 min at 100°C. Further studies involved heating the separated fractions of egg yolk. Results indicated that the viscosity of livetin was largely unaffected by heating, while the viscosity of low density lipoprotein (LDL) and high density lipoprotein (HDL) increased at >80°C; HDL showed the greatest increase in viscosity. Disc gel electrophoresis indicated that the major bands of HDL almost disappeared at >90°C. Large-sized particles were found by gel filtration in HDL and LDL heated at 60°C for 5 min. It is concluded that changes occurring in the turbidity and viscosity of egg yolk during heating are mainly due to the coagulation of HDL and LDL. [From En summ.] JA

## 5

[Storage changes in the fat fraction of frozen egg yolk.]

Sroczynski, E.; Plotka, A.; Matyniak, J.

*Przemysl Spozywczy* 34 (8) 307-308 (1980) [14 ref. Pl, ru, en, de, fr] [Cent. Osrodek Badawczo-Rozwojowy Drobialstwa, Poznan, Poland]

Commercial pasteurized (i) egg yolk and (ii) egg yolk with 12% NaCl stored in polyethylene bags in 12.5-kg cans at -15°C, were examined initially and after storage for 6, 9, and 12 months. Values at these times were, resp.: peroxide value (Lea value), (i) 0.26, 0.65, 5.42 and 0.28/g fat, and (ii) 0.27, 0.44, 5.86 and not given; benzidine value, (i) 5.8, 152.6, 110.3 and 107.6/100 g fat, and (ii) 27.2, 43.8, 54.9 and 79.8; thiobarbituric acid value, (i) 7.97, 0.93, 4.51 and 2.87/kg sample, and (ii) 7.29, 1.99, 8.04 and 0.66; and free fatty acids, (i) 2.09, 2.10, 2.34 and 3.19 g/100 g fat, and (ii) 1.80, 3.14, 4.18 and 4.73. GLC values for contents of 23 fatty acids in the free fatty acid fraction are tabulated. SKK

## 6

Ultrastructure of vitelline membranes from normal and mottled egg yolks.

Cunningham, F. E.; Ylander, D. M.

*Poultry Science* 59 (11) 2449-2455 (1980) [20 ref. En] [Dep. of Anim. Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66506, USA]

## 7

[Studies of the denaturation of protein components of egg yolk by acid or alkali.]

Tsutsui, T.; Obara, T.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 26 (9) 365-370 (1979) [14 ref. Ja, en] [Dep. of Agric. Chem., Tokyo Univ. of Agric., Sakuragaoka, Setagaya-ku, Tokyo, Japan]

The pH of an egg yolk solution was adjusted within the range 2-12 by the addition of 0.1N HCl or 0.1N NaOH. Max. amounts of precipitate and the highest turbidity were obtained at pH 5.5 while increased viscosity was observed at pH <4 and >10. Max. amounts of precipitate and highest turbidity were obtained at pH 7 in low density lipoprotein solution and at pH 4.5-5 in livetin solution; these phenomena were not related to changes in viscosity. High density lipoprotein in 5% NaCl solution showed high turbidity at pH <4 and >11; approx. 90% of this lipoprotein was precipitated at pH <4. Disc electrophoresis of egg yolk indicated that bands with  $R_f$  values  $\leq 0.2$  decreased at pH <5; such bands were major components of high density lipoprotein. On the basis of these results, it is concluded that changes in egg yolk viscosity are governed by the properties of high density lipoprotein. [From En summ.] JA

## 8

Oxidized positions of fatty acyl moieties of phosphatidyl-ethanolamine in liposome autoxidation.

Morita, M.; Tsushima, N.

*Agricultural and Biological Chemistry* 45 (6) 1413-1418 (1981) [11 ref. En] [Dep. of Food & Nutr., Japan Women's Univ., 2-8-1, Mejirodai, Bunkyo-ku, Tokyo 112, Japan]

Liposomes of soybean and egg yolk phosphatidylethanolamine (PE) were oxidized in the presence of Cu. Fatty acyl moieties with hydroxy and hydroperoxy groups attached were converted to methyl esters. The methyl esters were separated in TLC and then separated on silicic acid thin layer plates containing  $\text{AgNO}_3$ . After GLC purification, hydrogenated and trimethylsilylated samples were analysed for positional isomers in MS. Fatty acids, 18:2 and 18:3 in soybean PE and 18:2, 20:4, and 22:6 in egg yolk PE were examined. A singlet oxygen mechanism was presumably involved in part, but to explain the whole isomer pattern, some yet unexplained mechanism appears to be involved. AS

## 9

[Effect of zeolite in the feed of hens on the parameters of commercial eggs.]

Szabo, I.; Kota, M.; Juhasz, I.

*Baromfitenyesztes es Feldolgozas* 28 (3) 97-101 (1981) [Hu] [Agrartudomanyi Egyetem, Debrecen, Hungary]

Experimental results showed that 9% zeolite in the feed of laying hens had no significant effect on most parameters of the eggs (wt, numbers of damaged eggs, etc.). The increased Fe concn. found in the yolk of eggs laid by zeolite-fed hens could increase their nutritive value. ESK

## 10

Incorporation of selenium into egg proteins after feeding selenomethionine or sodium selenite.

Latshaw, J. D.; Biggert, M. D.

*Poultry Science* 60 (6) 1309-1313 (1981) [9 ref. En] [Dep. of Poultry Sci., Ohio Agric. Res. & Development Cent., 674 W. Lane Avenue, Columbus, Ohio 43210, USA]

An experiment was conducted to determine if Se incorporation into egg proteins could be predicted on the basis of methionine or cystine content. Chickens in egg production were fed a basal diet or the basal diet supplemented with 0.2 or 0.4 p.p.m. Se from selenite or 0.2 or 0.4 p.p.m. Se from selenomethionine. Eggs were collected from each group after feeding the diet 18 day. All of the egg white proteins and yolk fractions prepared contained Se, and all of them increased in Se when more was fed. The increase in Se in egg white proteins after feeding selenite did not appear to be related to the cystine content of the proteins. However, the increase in Se in egg white proteins after feeding selenomethionine appeared to parallel the methionine content of the proteins. The Se level of yolk fractions

was more closely related to the cystine content. Livetin fractions had the highest Se level, and low density fractions had the lowest. The data suggest that proteins synthesized in a tissue will have predictable amounts of Se but that proteins from different tissues will have different patterns of Se incorporation. AS

## 11

[Bacterial flora of fresh eggs, and eggs stored for 4 weeks.]

Gesche, E.; Schuler, A. M.

*Alimentos* 4 (3) 11-13 (1979) [9 ref. Es, en] [Inst. de Higiene & Salud Publica, Univ. Austral, Valdivia, Chile]

Studies were conducted on the bacteriological quality of (i) fresh eggs and (ii) eggs stored for 4 wk at ambient temp. No positive results were obtained from albumen or yolk samples. Fresh eggs had an average log count/total shell surface of 3.75 (range 3.45-4.14) vs. an average of 3.45 (range 3.10-4.23) for the stored eggs. % relative importance of various genera and groups of bacteria on the shell surface of fresh eggs were:

*Micrococcus* 61.31; *Staphylococcus* 31.16; *Bacillus* 5.53; *Pseudomonas* 0; *Enterobacteriaceae* 0.50;

*Acinetobacter* 1.00; and *Xanthomonas* 0.50.

Corresponding values for the stored eggs were 39.20, 24.12, 29.15, 3.51, 2.01, 2.01 and 0. Gram-negative bacteria comprised 2.00% of the shell flora of fresh eggs, vs. 7.53% for stored eggs. AJDW

## 12

Electrophoretic and chromatographic changes in egg yolk proteins due to heat.

Dixon, D. K.; Cotterill, O. J.

*Journal of Food Science* 46 (4) 981-983, 990 (1981) [14 ref. En] [Dep. of Food Sci. & Nutr., Univ. of Missouri-Columbia, Columbia, Missouri 65211, USA]

Polyacrylamide gel electrophoresis and diethylaminoethyl-cellulose ion-exchange chromatography were used to observe changes in egg yolk products which were heat treated at 3°C intervals from 54 to 84°C for 35 min. The USDA pasteurization temp. of 61.0, and 63.3°C for plain, 10% sugared, and 10% salted egg yolk, resp., had little effect on their electrophoretograms. Only the  $\gamma$ -livetins in plain yolk were slightly affected. Higher temp. progressively altered these proteins until they disappeared from the electrophoretograms from plain yolk at approx. 73°, sugared yolk at approx. 76°, and salted yolk at approx. 79°C. The lipovitellin fraction and phosvitins were similarly affected by increasing temp. Sugar and salt at 10% levels had a protective effect against heat, allowing resp. approx. 3° and 6°C higher temp. before heat damage occurred. The chromatograms from plain and sugared yolk were little affected by pasteurization. However, major changes were noted between unheated and pasteurized (63.3°C) salted yolk. Patterns for salted yolk, pasteurized at 63.3 and 68.0°C were similar, which further indicated that this product can be pasteurized at 68.0°C without significant damage. IFT

## 13

Effect of fiber on cholesterol metabolism in the *Coturnix quail*.

Sutton, C. D.; Muir, W. M.; Begin, J. J.

*Poultry Science* 60 (4) 812-817 (1981) [22 ref. En] [Dep. of Anim. Sci., Univ. of Kentucky, Lexington, Kentucky 40546, USA]

288 quail, 15 wk of age at the start of the trial, were used in a study on effects of various fibre sources added to a corn-soybean meal diet on yolk cholesterol concn. Fibre sources studied were alfalfa, wheat bran, dried brewers' grains, cellulose and pectin. Data are given for cholesterol concn. of egg yolks liver and serum, together with values for eggs laid/bird day. Differences in yolk cholesterol concn. were not significant; differences in egg production and in liver and serum cholesterol concn. were, however, significant. Serum and liver cholesterol concn. appeared to be inversely related to egg production. AJDW

## 14

Extraction and processing of various components from egg yolk.

Larsen, J. E.; Froning, G. W.

*Poultry Science* 60 (1) 160-167 (1981) [20 ref. En] [Anim. Sci. Dep., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

An extraction procedure was investigated to separate lipid, aqueous, and protein fractions from egg yolk. Two studies were completed to determine the optimal pH and solvent ratio. The solvents used were ethanol, isopropanol (IPA), hexane-ethanol, and hexane-IPA (77:23, w:w). The egg yolk:solvent:water ratios were 1:1:1, 1:0.5:2, 1:2:4, and 1:1:3. The 1:1:1 ratio at pH 6.0 was the best with hexane-IPA giving the highest egg oil yield. Analyses indicated that the crude lipid fraction

contained 80-95% lipid, with a high level of cholesterol (40 mg/g). The protein fraction contained 55% protein. Results of tests on mayonnaise preparation showed that none of the fractions, alone or in combination, were as stable as emulsions made from native yolk. The crude oil fraction was degummed, refined, and bleached. The cholesterol content was reduced by 40% by refining, and free fatty acids were reduced from 3.4 to 0.65% after refining. Fatty acid composition analysis of the crude and unprocessed oils showed a decrease in the ratio of unsaturated to saturated fatty acids as compared to intact egg yolk. The sensory evaluation of heated egg oil indicated that further processing with improved conditions would aid the desirability of egg yolk oil as a commercial product. AS

## 15

[Further study on the effect of sucrose and sodium chloride on gelation and unfreezable water of egg yolk during freezing.]

Wakamatu, T.; Sato, Y.; Saito, Y.

*Journal of the Agricultural Chemical Society of Japan* [Nihon Nogei Kagakkai-shi] 54 (11) 951-957 (1980) [13 ref. Ja, en] [Basic Res. Lab., Q. P. Co., Sengawa-cho, Chofu, Tokyo 182, Japan]

The apparent viscosity of frozen-thawed sugared yolk with 2-20% sucrose and frozen-thawed salted yolk with 2-10% NaCl and their ice contents were measured during freezing and thawing with a viscometer and differential scanning calorimeter (DSC), resp., to clarify the inhibitory effect of sucrose and NaCl on gelation of egg yolk. The extent of gelation and ice content in sugared yolk was reduced with increased sucrose concn. The addition of 2 and 4% NaCl prevented the gelation of yolk when frozen between -5°C and -60°C. In contrast, the addition of >6% NaCl did not inhibit gelation when frozen below -40°C. DSC analyses at room temp. to -55°C indicated that an eutectic mixture of ice and NaCl was formed in salted yolk with >6% NaCl and this caused the gelation. On the other hand, such a eutectic mixture was not detected in salted yolk with the gelation. On the other hand, such a eutectic mixture was not detected in salted yolk with <4% NaCl in DSC thermograms. AS

## 16

High pressure liquid chromatographic separation of molecular species of phosphatidic acid dimethyl esters derived from phosphatidylcholine. Hsieh, J. Y.-K.; Welch, D. K.; Turcotte, J. G. *Lipids* 16 (10) 761-763 (1981) [11 ref. En] [Dep. of Med. Chem., Coll. of Pharmacy, Univ. of Rhode Island, Kingston, Rhode Island 02881, USA]

A majority of the individual molecular sp. of phosphatidic acid dimethyl esters derived from multispecies egg yolk and soybean, phosphatidylcholines have been separated by reverse-phase HPLC. 2 Partisil-10 ODS columns connected in tandem and the eluents acetonitrile or methanol/water (95:5) were used for molecular sp. resolution, based on total fatty acyl C number and degree of unsaturation. AS

## 17

[Genotype x nutrition interaction in commercial hens. II. Effect of protein level and strain on levels of protein, lipids and total solids in the yolk.] Campos, E. J.; Nunes, M. B.

*Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais* 33 (2) 321-326 (1981) [9 ref. Pt, en] [Escola de Vet., Univ. Fed. de Minas Gerais, Belo Horizonte, Brasil]

Hens of 4 commercial strains received isocaloric diets with 15, 16, or 17% protein; eggs were collected, and the yolks analysed for protein, lipids and TS. Tables of results are given. Little effect of either hen strain or dietary protein level on the yolk constituents studied was detected; nor was a strain x diet interaction observed. AJDW

## 18

[Studies on improvement of the quality of eggs. I. Effect of feeding with cholesterol and Sephadex.] Konno, T.; Asada, T.; Katsuki, T. *Bulletin of the Nippon Veterinary and Zootechnical College* No. 29, 74-80 (1981) [25 ref. Ja, en] [Dep. of Anim. Nutr., Nippon Vet. & Zootech. Coll., Japan]

Groups of laying hens were fed 4 diets: (i) a control diet; (ii) a diet with 0.5% cholesterol; (iii) a diet with 1.0% sephadex and (iv) a diet with 0.5% cholesterol + 1.0% sephadex for up to 28 days. Tables of data are given, including values for cholesterol, vitamin A and fatty acid concn. in the egg yolk. Diets (i) and (ii) had little effect on egg yolk cholesterol concn.; diets (iii) and (iv) caused a decrease in yolk cholesterol concn. during the first 14 days of the experiment, followed by an increase. Little effect of diet on vitamin A content of the egg yolk was observed. There was a tendency for myristic acid content of the yolk to increase and for oleic acid concn. to decrease as a result of addition of cholesterol to the diet. [From En summ.] AJDW

## 19

Fate of phospholipid (lecithin) during processing and storage of salad dressing containing egg yolk. (In 'Quality of eggs. Proceedings of the First European Symposium' [see FSTA (1982) 14 8Q120]) [Lecture] Germs, A. C.

pp. 52-56 (1981) [14 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Beekbergen, Netherlands]

Problems with detn. of the egg yolk content of salad dressings on the basis of phospholipid concn. are discussed. Commercial and laboratory-prepared salad dressings were analysed by the Netherlands standard 'Mayonaise- en Slasausbesluit' method, and by Germs' new method [*De Ware-Chemicus* (1979) 9, 23-26]. Studies were also conducted on effects of predigestion with  $\alpha$ -amylase or treatment with  $H_3BO_3$  on recovery of phospholipids. Tables of results are given. The results show that the Mayonaise- en Slasausbesluit method gives a low result for phospholipid concn., as a result of complexing of phospholipid with starch. Germs' method overcomes this difficulty; however, it does not liberate phospholipid which becomes complexed with sucrose during storage. Trials confirmed that phospholipids may form complexes with sucrose during storage at room temp. or at 4°C. AJDW

## 20

[Yolk lecithin preparation.]

Asahi Kasei Kogyo KK

*Japanese Examined Patent* 5 647 915 (1981) [Ja]

Process is described for preparing lecithin, in which raw egg yolk is contacted with liquid dimethyl ether to break the emulsion of yolk + lecithin, after which neutral lipids and a portion of the water are extracted for recovery of the lecithin. The lecithin can be used in food manufacture. IFT

## 21

## Chemical characterisation of the vitelline membrane of hens' eggs.

Trziszka, T.; Smolinska, T.

*Food Chemistry* 8 (1) 61-70 (1982) [20 ref. En] [Inst. of Storage & Food Tech., Agric. Acad., Norwida 25/28, 50-375 Wroclaw, Poland]

The chemical composition of the vitelline membrane of hens' eggs, both fresh and stored ( $\pm 1^{\circ}\text{C}$ ) for 6 months, was studied. The results indicate that the vitelline membrane contains mainly protein compounds with some carbohydrates and lipids. The amounts of particular components depend on the method of preparation. During cold storage there is a loss of nitrogen, and changes in the chemical composition of the vitelline membrane should first be considered in respect of the protein part of the membrane. AS

## 22

## [Study of some routes of ampicillin excretion in farm animals.]

Chaleva, E.

*Veterinarnomeditsinski Nauki* 18 (3) 92-96 (1981) [7 ref. Bg, ru, en] [Tsentralen Nauchnoizsled. VetMed. Inst., Sofia, Bulgaria]

18 lactating ewes were divided into 3 groups of 6, which received (i) 25 mg ampicillin trihydrate/kg body wt. intramuscularly, (ii) 25 mg ampicillin sodium intramuscularly or (iii) 50 mg ampicillin trihydrate/kg body wt. orally after 10%  $\text{CuSO}_4$  solution had been applied to the buccal mucosa. Milk samples were taken at intervals for  $\leq 48$  h after treatment. Ampicillin was detected in milk of groups (i) and (ii) 30 min after administration, reached max. concn. of 0.39 and 0.75  $\mu\text{g}/\text{ml}$  resp. 4 h after administration, and persisted for 24 and 14 h, resp. In group (iii) milk, ampicillin content reached 0.1  $\mu\text{g}/\text{ml}$  in 2 ewes and was detectable for  $\leq 8$  h. 3 groups of laying hens received resp. ampicillin sodium in drinking water at 500  $\text{mg}/\text{l}$  for 3 days, or ampicillin trihydrate by mouth at 20 or 60 mg/kg body wt. for 6 days. Ampicillin appeared in egg content only after administration of 60 mg/kg body wt., reaching max. concn. of 0.05  $\mu\text{g}/\text{ml}$  in the white and 0.03  $\mu\text{g}/\text{ml}$  in the yolk 4 days after administration and remaining detectable for up to 8 and 6 days, resp. SKK

## 23

## [Effect of succinylation on the emulsifying properties of egg yolk protein components.]

Tsutsui, T.; Obara, T.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (6) 293-297 (1980) [12 ref. Ja, en] [Seikoku Junior Coll. of Nutr., 4-6 Nishi-Shinkoiwa, 1-chome, Katsushika-ku, Tokyo 124, Japan]

Egg yolk low and high density lipoproteins (LDL and HDL) were succinylated to 3 different degrees. Succinylation increased viscosity progressively, and altered the solubility characteristics of the proteins. The emulsifying activity of both proteins was decreased by succinylation, LDL more so than HDL, but in both cases emulsion stability was increased with increasing succinylation. [From En summ.] JRR

## 24

## Determination of main mineral contents in hen's egg yolk fractions.

Wakamatu, T.; Sato, Y.; Saito, Y.

*Agricultural and Biological Chemistry* 46 (2) 577-578 (1982) [5 ref. En] [Basic Res. Lab., QP Co., Sengawa-cho, Chofu, Tokyo 182, Japan]

Egg yolk plasma and granule fractions were prepared by centrifugation of diluted egg yolk, and mineral contents in each fraction were determined by AAS, except for P, which was determined colorimetrically. Plasma and granule constituted 77 and 23%, resp. of yolk DM. Contents of minerals in whole yolk (mg/g DM) and % of each in the granule fraction resp. were as follows: K 3.27, 9.4; Na 0.80, 7.4; P 12.08, 38.0; Ca 2.72, 83.3; Mg 0.26, 67.9; and Fe 0.10, 99.0. Yolk and fractions were dialysed to determine % undialysable fraction for each mineral. % (of initial content) mineral in whole yolk and granule that was not dialysable was as follows: K 1.2, 0.8; Na 1.3, 3.8; P 98.3, 99.0; Ca 78.7, 99.0; Mg 57.7, 94.9; and Fe 90.0, 77.1. DIH

## 25

## [Effect of acetylation on emulsifying properties of egg yolk protein components.]

Tsutsui, T.; Matsumoto, S.; Obara, T.

*Journal of Japanese Society of Food Science and**Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (9) 448-452 (1980) [13 ref. Ja, en] [Seitoku Junior Coll. of Nutr., 1-4-6 Nishishinkoiwa, Kasushika-ku, Tokyo, 124 Japan]

Acetylation of egg yolk high- and low-density lipoproteins to 3 different degrees increased viscosity of both fractions. Stability of emulsions formed by the acetylated proteins was greater than those of the native proteins. [From En summ.] JRR

## 26

## [Effect of frozen storage on the emulsifying property of hen's egg yolk.]

Wakamatu, T.; Sato, Y.; Saito, Y.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 28 (5) 247-252 (1981) [11 ref. Ja, en] [Basic Res. Lab., Q.P. Co., Sengawa-cho, Chofu, Tokyo 182, Japan]

The effects of time in frozen storage on the viscosity, solubility, emulsifying capacity (EC) and emulsion stabilizing capacity (ESC) of hens egg yolk were investigated. Plain and salted (10% NaCl) yolk was stored at  $-20^{\circ}\text{C}$ , tightly sealed from 3 to 180 days; increases of free fatty acids were not observed under these conditions. Thiobarbituric acid values increased gradually during frozen storage. Apparent viscosity of plain yolk markedly increased, and the solubility decreased during 3 days storage, with a gradual increase in viscosity thereafter. Reductions in EC and ESC paralleled the viscosity changes. The apparent viscosity of the salted yolk increased gradually during storage, but solubility was not lowered. Reductions in EC and ESC were smaller for the salted than the plain yolk. [From En summ.] JRR

## 27

**Effects of branched and straight chain amines and azasteroids on blood and egg cholesterol of White Leghorn chickens.**

Cecil, H. C.; Bitman, J.; Svoboda, J. A.; Thompson, M. J. *Poultry Science* 60 (4) 795-804 (1981) [24 ref. En] [USDA, Sci. & Education Administration, Agric. Res., Avian Physiol. Lab., Beltsville, Maryland 20705, USA]

Studies were conducted to evaluate the potential for use of feed additives to reduce the cholesterol content of eggs. Additives tested were *N,N*-dimethyldodecanamine, *N,N*-dimethyltetradecanamine, *N,N*-dimethylhexadecanamine, *N*-ethyloctadecanamine, *N,N*-dimethyloctadecanamine, *N,N*-3,7,11-pentamethyldodecanamine, diazacholesterol, azacoprostane and azacholestone. The amines were fed at concn.  $\leq$  200 p.p.m., the azasteroids at  $\leq$  5 p.p.m., these additives being fed to laying hens for 4 wk. Of the amines, only *N,N*-3,7,11-pentamethyldodecanamine reduced the cholesterol concn. in eggs; all 3 azasterols reduced yolk cholesterol concn. Demosterol concn. in the yolk increased with decreasing yolk cholesterol concn. Azasteroids seriously reduced egg production. The rate of restoration of cholesterol concn. to its original value after withdrawal of these feed additives was also studied. AJDW

## 28

**Application of the AOAC multi-residue method to determination of synthetic pyrethroid residues in celery and animal products.**

Braun, H. E.; Stanek, J.

*Journal of the Association of Official Analytical Chemists* 65 (3) 685-689 (1982) [13 ref. En] [Provincial Pesticide Residue Testing Lab., Ontario Min. of Agric. & Food, Guelph, Ontario, Canada NIG 2W1]

A procedure based on current multi-residue methodology is described for the detn. of synthetic pyrethroid residues in vegetable and animal tissues. Permethrin, cypermethrin and fenvalerate were extracted from celery, egg yolk, beef muscle and milk with acetonitrile, partitioned into hexane, and cleaned up on Florisil for quantitation by electron capture gas chromatography. Recoveries of the 3 pyrethroids averaged 94-103% from celery and 82-97% from animal products. Min. detectable contents were  $< 5$  ng/g. The method also allows for the simultaneous extraction and cleanup of organochlorine hydrocarbon insecticides. AS

## 29

**[Yolk colour as an egg quality factor.]**

Zintzen, H.

*Magyar Allatorvosok Lapja* 37 (3) 189-193 (1982) [Hu, en, de, ru] [Jacquingasse 16-18, 1030 Vienna, Austria]

Among large numbers of carotenoids tested, apocarotenoic acid ester and canthaxanthin proved to be especially effective in yolk pigmentation. In the case of apocarotenoic acid ester, the improvement of visually noticeable yolk colour beyond the 'Roche Yolk Colour Fan' value 10 was uneconomic. With canthaxanthin the optimum effect was obtained when combined with relatively low levels of other carotenoids. ESK

## 30

**[Effects of freezing temperature and storage time on gelation and the quantity of unfrozen water of hens egg yolk.]**

Wakamatu, T.; Sato, Y.; Saito, Y.

*Journal of the Agricultural Chemical Society of Japan [Nihon Nogei Kagakkai-shi]* 55 (8) 699-704 (1981) [9 ref. Ja, en] [Basic Res. Lab., Q.P. Co., Sengawacho, Chofu, Tokyo 182, Japan]

When egg yolk was frozen and stored above  $-10^{\circ}\text{C}$  for 72 h before thawing, its fluidity was retained. Differential scanning calorimetry (DSC) showed that unfrozen water in yolk exceeded the level of unfreezable water (0.16 g/g solids) at temp. of  $-5$  to  $-10^{\circ}\text{C}$ . Reduction of temp. to the range  $-15^{\circ}$  to  $-20^{\circ}\text{C}$  for 24 h storage caused a gradually increasing degree of yolk gelation. The temp.-time curve during freezing, and DSC analysis, indicated that all freezable water was transformed to ice in a few h under these conditions. At temp. of  $-11$  to  $-44^{\circ}\text{C}$ , the unfrozen water of yolk was found to be about 0.15-0.25 g/g solids. Fluidity was retained in yolk stored at  $-60^{\circ}\text{C}$ , but was lost on subsequent storage at  $-20^{\circ}\text{C}$  for a few h. These effects were explained by removal of water and of ice from around the lipoprotein molecules due to repeated freezing and remelting during frozen storage. [From En summ.] JRR

# POULTRY

## 1

[Methods of determination of antibiotics and other medicaments in food products.] Metody oznaczania antybiotykow i innych lekow w srodkach spozywczych. [Book]

Poland, Panstwowy Zaklad Higieny  
22pp. (1978) [Pl] Warsaw, Poland

This publication contains the following papers:

Detection of sulphaquinoxaline in poultry meat by TLC, by E. M. Rutczynska-Skonieczna (pp. 1-7).

Determination of erythromycin in poultry meat by TLC, by E. M. Rutczynska-Skonieczna (pp. 8-14).

Determination of chloramphenicol residues in meat by TLC, by I. Karkocha (pp. 15-17). Determination of streptomycin residues in milk by colorimetry, by K. Rybinska (pp. 18-22). HBr

## 2

[Level of microbiological contamination of some 'Canada approved' abattoirs and meat processing enterprises.]

Simard, R. E.; Auclair, G.

*Canadian Institute of Food Science and Technology Journal* 14(2) 128-134 (1981) [12 ref. Fr, en] [Dep. des Vivres, Univ. Laval, Quebec, Quebec G1K 7P4, Canada]

6-7 consecutive sanitary surveys were conducted in 5 different "Canada Approved" meat packing plants and slaughterhouses to establish the level of bacterial contamination on working surfaces as well as on surfaces of slaughtered animals (chicken and beef) during their processing. The various microbiological parameters evaluated were total aerobic plate count (TAPC) at 22° and 35°C, total and faecal coliforms, faecal streptococci, mould and yeasts and *Salmonella*. A total of 634 samples was collected at different critical control points during these sanitary surveys in 1976-1977. Contamination of the working surfaces in various plants varied from  $10^5$  to  $10^8/77 \text{ cm}^2$  for the TAPC at 22° and 35°C;  $10^4$  to  $10^5$  for yeasts and moulds;  $10^3$  to  $10^5$  for total coliform and  $10^3$  for faecal streptococci, while only a few faecal coliform and *Salmonella* were isolated. Samples at the broiler plant showed an initial level of *Salmonella* of 76.9%. Surfaces of beef carcasses at the packing plants were also monitored; the TAPC fluctuated from  $10^2$  to  $10^9/77 \text{ cm}^2$ . This high level of contamination could contribute to the high bacterial counts on the working surfaces. At time of sampling, every plant was inspected, the results of the latest sanitary survey discussed, and improved cleaning and disinfection techniques were suggested. The level of contamination was reduced considerably, as evidenced after the final sanitary survey which showed a 1000 fold decrease in TAPC. *Salmonella* positives decreased to 4.5% at the broiler slaughtering plant. It is concluded that is possible, with good manufacturing practices and appropriate cleaning and sanitizing procedures, to maintain low microbial levels on equipment and working surfaces. AS

## 3

**Evaporative air chilling of sub-scald poultry.**

Veerkamp, C. H.

*Poultry International* 20 (1) 16, 18, 20, 22, 104, 111 (1981) [En, de, fr, es, ja, ar, it] [Spelderholt Inst. for Poultry Res., Beekbergen, Netherlands]

After an initial brief discussion of limitations of most alternatives to immersion chilling of sub-scalded poultry, a new evaporative air-chilling process, developed by Meyn BV and installed at the Storteboer BV plant in the Netherlands is described. The method is based on spraying the carcasses with water, followed by blowing cold air (at 6°C, flow rate 1 m/s) onto them. Broiler carcasses (average wt. 1 kg) are cooled from approx. 30°C to 10-12°C in 30 min, each carcass being sprayed with a total of approx. 0.5 l water, divided between 7 spraying operations. Average carcass wt. is the same before and after spraying. No discolouration of the broilers occurs. Taste trials showed meat from broilers chilled by this method to be preferred to that from broilers chilled by immersion. AJDW

## 4

[Chromatographic method for identification of the antibiotic tylosin in poultry meat and viscera.]

Matvienko, I. N.; Pripitina, L. S.; Kruglyak, E. B.

*Ratsional'noe Pitanie, Respublikanskii*

*Mezhvedomstvennyi Sbornik* No. 15, 61-62 (1980)

[Ru] [Kievskii NII Gigienny Pitaniya, Kiev, USSR]

## 5

[Comparison of slaughter values of GL-Iv-f, GL-Iv-l, Rhine, and Cuban geese.]

Benkova, J.; Stasko, J.; Kun, S.

*Zivocisna Vyroba* 25 (3) 213-219 (1980) [21 ref. Sk, ru, en, de] [Vyskumny Ustav Chovu & Slachtenia Hydiny, 900 28 Ivanka pri Dunaji, Czechoslovakia]

Meat production performance was studied of (i) 393 female and 234 male GL-Iv-f geese (line developed in the authors' Institute from Italian (80%) and Rhine (20%) geese); (ii) 118 female and 95 male Rhine geese imported from Hungary, (iii) 115 female and 100 male GL-Iv-l geese (line developed in the authors' Institute from a cross of Slovak ganders with Landrace geese); and (iv) 221 female and 122 male 'Cuban' geese from the USSR. (i)-(iv) were fed on standard feed mixtures. Body wt., dressing out %, and wt. and % of breast and thigh parts were determined for groups of (i)-(iv) at 8, 10, 12, 14 and 16 wk of age. Values for females, males and overall are tabulated in detail. Against a background of mean overall body wt. at 16 wk of 4863, 4961, 5239 and 4187 g for (i)-(iv) resp., corresponding dressing out % were 74.96, 75.54, 74.43 and 74.97%; corresponding % of breast were 29.29, 29.17, 29.98 and 26.59; and corresponding % of thigh were 27.64, 26.73, 26.66 and 27.98. SKK

## 6

**Method and apparatus for eviscerating poultry.**

Scheier, D. J.; Hathorn, J. L. (Simon-Johnson Inc.)

*United States Patent* 4 262 387 (1981) [En]

7

**Poultry processing.**

Mil, M. P. G. van (Stork PMT BV)

*United States Patent* 4 266 322 (1981) [En]

Apparatus is described for making a cut in a slaughtered bird to open the skin of the bird forward of the vent toward the breast point. It employs rotary knife means to cut a circular opening at the vent, a generally straight edge knife means mounted on a swinging arm, the mounting means for the 2nd knife and an associated framework with cooperating means to define a path of travel. IFT

B

**Poultry abattoir.**

Ryan, J. W.

*UK Patent Application* 2 056 255A (1981) [En]

Abattoir apparatus employs rotating arms and carousel supporting apparatus to advance the poultry through processing stations. IFT

9

**[Use of textured vegetable proteins of "chicken" type in poultry meat products.]**

Filipan, I.; Dimitrijevic, D.; Perovic, M.

*Tehnologija Mesa* 21 (10) 294-296 (1980) [6 ref. Sh, en]

[Prehrambena Ind. "Podravka", Koprivnica, Yugoslavia] New textured protein preparations with poultry meat flavour are described: they can be used in poultry meat products, especially frankfurters. The preparations, marketed under the brand name "Chicken", are similar to white poultry meat in colour, taste and aroma. Addition of these textured vegetable protein preparations does not affect the organoleptic properties and chemical analysis of poultry products. STI

10

**Mechanically deboned poultry meat.**

Keshri, R. C.; Shyamsunder, G.; Singh, B. P.

*Poultry Guide* 18 (6) 33-34 (1981) [En] [Cent. Avian Res. Inst., Izatnagar-243 122, India]

A brief discussion is given of the principle and procedure of mechanical deboning of poultry meat, the composition, colour, flavour, and microbiological quality of mechanically deboned poultry meat, and its applications. CFTRI

11

**Apparatus for automatic evisceration of killed poultry.**

Loth, K.; Loth, P.

*United States Patent* 4 270 242 (1981) [En]

Apparatus for the automatic evisceration of killed poultry employs a horizontal supporting plate to receive poultry lying on its back, clamping means for securing the tail-head of the poultry to the supporting plate (the clamping device being detachable from the poultry), and an evisceration tool. RAW

12

**Breast splitting apparatus.**

Lewis, E. J.

*United States Patent* 4 270 243 (1981) [En]

Apparatus is described for positioning and moving poultry carcasses to permit the splitting of their breasts. IFT

13

**Health laws and regulations - New Zealand.**

World Health Organization

*International Digest of Health Legislation* 30 (4) 821-835 (1979) [En] [Geneva, Switzerland]

A selection of New Zealand health laws and regulations is presented including the following which relate to food hygiene (pp. 824-825, 829-830): The Fish (Packing for Export) Regulations 1977. Serial No. 1977/161 (dated 20 June 1977); The Dairy Industry Regulations 1977. Serial No. 1977/308 (dated 5 Dec. 1977); The Poultry Processing Houses Licensing Commencement Order 1978. Serial No. 1978/39 (dated 6 March 1978); The Poultry Processing Regulations 1978. Serial No. 1978/40 (dated 6 March 1978); and The Food & Drug Regulations 1973, Amendment No. 3 (miscellaneous provisions). Serial No. 1978/41 (dated 6 March 1978). VJG

14

**[Influence of various kinds of fatty tissue on the quality of cooked sausages (frankfurter type) produced from poultry meat.]**Stankovic, S.; Kicec, N.; Nedeljkovic, L.; Vojinovic, G. *Tehnologija Mesa* 21 (5) 155-158 (1980) [Sh, en]

[OOUR 'Zivinostok' Backa Topola, Yugoslavia]

Studies were conducted on effects of addition of 25% (i) pork lard, (ii) beef suet or (iii) chicken fat to frankfurter sausage emulsion based on poultry meat and made with 30% ice, on the quality of the sausages. Quality criteria considered included surface and interior colour, consistency, juiciness, flavour and odour. Sausages made with (i) were of unacceptable quality. Those made with (ii) and (iii) showed only minor differences in colour: flavour and odour were identical. STI

15

**Opening method for poultry carcasses.**

Hathorn, J. L.; Scheier, D. J. (Gordon Johnson Co.)

*United States Patent* 4 265 001 (1981) [En]

Method is described for making an enlarged opening in the body cavity of a bird while only the thighs and legs of the bird are clamped against a stationary shoulder, such that the trunk portion of the bird may yield outwards during the slitting stroke of the cutting knife, avoiding keel bone damage. IFT

## 16

## Poultry processing.

Graham, K. Z.

UK Patent Application 2 058 544A (1981) [En]

Apparatus is described for removing poultry entrails from gizzards; entrails are positioned beneath the gizzards and a horizontal cutting disc is used. IFT

## 17

## [In vitro effects of certain chemotherapeutic agents on pathogenic bacteria isolated from poultry.]

Samba, C.

Magyar Allatorvosok Lapja 36 (2) 131-132 (1981)

[10 ref. Hu]

The resistance of *Escherichia coli*, salmonellae, *Pasteurella multicida*, and staphylococci isolated from poultry carcasses to 10 chemotherapeutic agents (neomycin, chloramphenicol, oxytetracycline, erythromycin, polymyxin-B, furazolidone,  $\omega$ -trimoxazole, superseptyl, penicillin and streptomycin) was compared and tabulated for the periods of 1973-74 and 1977-78. ESK

## 18

## Removal of indicator organisms by chemical treatment of wastewater.

Zutter, L. de; Hoof, J. van

Zentralblatt für Bakteriologie, 1B 173 (3/4) 266-272 (1981) [17 ref. En, de] [Lab. for Hygiene & Tech. of Food of Anim. Origin, State Univ. of Ghent, Wolterslaan 12, B-9000 Ghent, Belgium]

Effect of treatment of wastewater with sodium lignosulphonate on aerobic plate count and levels of indicator microorganisms was studied with effluents from a pig slaughterhouse and a poultry processing plant. Reductions in counts of indicator organisms of 2-4 logs were obtained at working pH of 2.3-3.0. This treatment removed significantly greater amounts of indicator organisms than does biological wastewater treatment. DIH

## 19

## The assessment of the bacteriological condition of fresh poultry in shop and market places.

Notermans, S.; Erne, E. H. W. van; Beckers, H. J.; Oosterom, J.

Fleischwirtschaft 61 (1) 101-104 &amp; 131-134 (1981)

[many ref. En &amp; De] [Nat. Inst. of Public Health, 3720 BA Bilthoven, Netherlands]

The bacteriological state of fresh poultry from shops and markets was evaluated by 2 methods, i.e. whole-carcass rinsing and skin maceration. Results from 50 carcasses, shown graphically and in tables, revealed considerable variations in counts of total aerobes, Enterobacteriaceae and psychrophilic bacteria, as well as between the 2 sampling methods. The rinsing method was preferred for detn. of pathogens and the risk of cross-contamination; skin maceration was preferred for detecting all the bacteria present and evaluating slaughter and storage hygiene. *Salmonella* and *Staphylococcus aureus* were detected by the rinsing

method on 42 carcasses examined (mean 63 salmonellae/carcass, 20 serotypes). There was no correlation between counts of salmonellae and enterobacteriaceae and no suggestion of an increase in salmonellae during storage under practical conditions. The mean count of *Staph. aureus* was  $3 \times 10^4$ /carcass; it was found on all carcasses. *Campylobacter fetus* ssp. *jejuni* was found on 8 (16%) of carcasses; no *Clostridium perfringens* was detected on any carcass by either method. The importance of good refrigeration conditions during storage is emphasized. RM

## 20

## [Sausages from poultry meat. Cooked sausage: blood sausage (Blutwurst).] Wurstwaren aus Geflügelfleisch. Kochwurst: Blutwürste.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

German Democratic Republic Standard TGL 34778/02, 6pp. (1978) [De]

This standard applies to cooked blood sausage made of meat from poultry, and covers definitions, ingredients (including additives), casings, sensory evaluation, testing, packaging, transport (at 0-12°C) and storage (short-term at 0-6°C, away from light). Specific requirements include (max. ranges depending on type): moisture content, 52-54%; fat, 23-32%; NaCl, 2-2.5%. Min. protein shall be 12-19 %. KME

## 21

## [Pies and rolled boned meat from poultry.] Pasteten und Rouladen aus Geflügelfleisch.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

German Democratic Republic Standard TGL 36544, 6pp. (1978) [De]

This standard applies to pies containing boned meat from poultry (chicken, turkey, goose, duck) or to turkey meat as rolled joints. It covers definitions, ingredients, packaging (Al foil), sensory requirements, testing, transport (at 0-20°C), and storage (short-term at 0-6°C away from light). Specific requirements include (max. ranges depending on type): moisture content, 64-70%; fat, 13.5-22%; NaCl, 1.9-2%; and energy content, 750-1100 kJ/100 g. Min protein shall be 13.5-15.5%. KME

## 22

## [Sensory quality testing. Assessment of pies and rolled boned meat from poultry.] Sensorische Qualitätsprüfung. Beurteilung von Pasteten und Rouladen aus Geflügelfleisch.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

German Democratic Republic Standard TGK 36545, 5pp. (1978) [De]

This standard lays down criteria for a scale (0-5) of sensory assessment of pies containing boned meat from poultry (chicken, turkey, goose, duck) or of turkey meat as rolled joints. A table of weighting factors is given. KME

23

[Treatment of] Meat-, fish-, and poultry-processing wastes. [Review]  
Litchfield, J. H.

*Journal, Water Pollution Control Federation* 53 (6) 787-791 (1981) [56 ref. En] [Battelle-Columbus Lab., Columbus, Ohio, USA]

live wt. and age are discussed. It is concluded that carcass yield and breast muscle wt. is dependent more on age than on live wt. Females grew more rapidly than males; at equal live wt., carcass yield is greater in females than in males. Carcass quality characteristics generally differed little between males and females.

AJDW

24

Shackling apparatus for live poultry.

Parker, A. E., Jr.

*United States Patent* 4 272 863 (1981) [En]

An apparatus for shackling and handling live poultry is based on gathering the live fowl on foot at the farm, and conveying successive groups of the gathered fowl into shackles in which the live fowl are transported from the farm to the processing plant. At the processing plant, the releasable shackles containing groups of fowl are supported on the processing conveyor for suspending the fowl during processing. AS

25

[Studies on energy, crude protein and amino acid requirements of Cairina-2000 Muscovy ducks (*Cairina moschata domestica*). III. Effect of the crude protein content of the feed at various stages of development on growth and carcass quality.]

Untersuchungen zum Energie-, Rohprotein- und Aminosäurebedarf von Cairina-2000 (*Cairina moschata domestica* L.). III. Einfluss des Rohproteingehaltes der Ration in unterschiedlichen Entwicklungsabschnitten auf die Mast- und Schlachtleistung.

Schubert, R.; Richter, G.; Putsche, M.

*Archiv für Tierernährung* 31 (7/8) 527-536 (1981) [5 ref. De, ru, en] [Sektion Tierproduktion & Veterinärmed., Karl-Marx-Univ., Leipzig, DDR-6900 Jena, German Democratic Republic]

2700 male Cairina-2000 Muscovy ducks were used in a study on effect of 5 dietary regimes differing in protein allowance at various stages of development on growth and carcass quality. The ducks were slaughtered at 69-81 days of age. Tables of results are given, including data for the % meat, skin and internal fat in the live wt. No significant effects of the dietary protein regimes on these carcass characteristics were observed.

AJDW

26

[Development of carcass composition of the Muscovy duck.]

Romboli, I.

*Zootecnica e Nutrizione Animale* 6 (5/6) 319-330 (1980) [3 ref. It, en] [Cattedra di Zoocoltura, Univ. di Pisa, Italy]

200 'Nera' breed Muscovy ducks were used in a study on growth and carcass composition over the period 16-88 days of age for males, 16-77 days of age in females. Tables and graphs of data are given for live wt., eviscerated wt., % dressed carcass, breast muscle, bones and giblets (live wt. and carcass wt. bases), and meat:bone ratio. Changes in these values in relation to

27

Distributed plural station bagging system for poultry.  
Altenpohl, W. F.; Altenpohl, P. J. (W. F. Altenpohl Inc.)  
*United States Patent* 4 270 336 (1981) [En]

Releasable poultry suspended from a conveyor are distributed amongst a number of stations along a travel path of the conveyor from which the poultry are released. Sensors control release so that it is effected only at those stations at which the product bagging apparatus is inactive. Lock-out devices at each station prevent release while the bagging apparatus is in operation for a predetermined period. AS

28

[Amino acid composition of soft by-products of various poultry species.]

Savran, E. G.; Pavlova, V. A.

*Voprosy Pitaniya* No. 4, 71-74 (1980) [18 ref. Ru]  
[Nauchno-Proizvodstvennoe Ob'edinenie 'Kompleks', USSR]

The amino acid composition of the soft by-products of poultry, i.e. hens, chickens, geese and ducks, was determined (by Hitachi Auto-Analyzer) and the results were compared with the literature findings. Data are tabulated for contents of 19 amino acids in the heart, liver and gizzard of the 4 sp. of poultry. Taking protein essential amino acid contents of chicken muscle as 100, corresponding values were 105 for liver, 100 for heart and 92 for gizzard. RAW

29

[Rationalisation results in a completely automatic poultry plucking line.] Vollmechanisierung der Geflügelentfederungslinie durch betriebliche Rationalisierung.

Zöphel, K.-H.

*Fleisch* 35 (3) 49-50 (1981) [De] [VEB Kombinat Industrielle Mast, Königs Wusterhausen, German Democratic Republic]

A fully automatic poultry slaughtering installation is described, capacity 2000-10 000 broilers/h. Neck position in relation to the cutter is adjusted on the basis of size and wt. of the individual bird. The slaughtering technique increases yield by up to 4 g meat/carcass. The installation can be incorporated into any poultry slaughtering line. IN

30

Ornithosis in poultry workers.

Andrews, B. E.; Major, R.; Palmer, S. R.

*Lancet* 1 (8221) 632-634 (1981) [8 ref. En] [Public Health Lab. Service, Norwich Lab., Norwich, UK]

An outbreak of ornithosis in duck workers in the winter of 1979 and spring of 1980 was discovered by investigation of a cluster of cases in Norfolk. A serological survey showed that 61% of duck workers

but only 23% of control poultry workers had chlamydia group antibody titres of  $\geq 1:8$ . Altogether 9% of duck workers in the survey had antibody titres  $\geq 1:32$  and a clinical illness suggestive of ornithosis. The proportions of seropositive tests and clinical attack rates were highest in workers eviscerating ducks and lowest in farm workers. It is suggested that a clinical history of contact with poultry should be considered relevant in the diagnosis of ornithosis and that clinicians caring for poultry workers should consider the possibility of ornithosis as an occupational disease. AS

### 31

[Effect of breed, sex and age on quality of goose meat.]

Puchajda, H.

*Przemysl Spozywczy* 35 (3) 99-100 (1981) [8 ref. Pl, ru, en, fr, de] [Inst. Hodowli & Tech. Produkcji Zwierzecej, AR-T, Olsztyn, Poland]

Italian, Kartuzy, Zator, Bilgoraj and Suwalski geese hatched in May were reared customarily for 24 wk, batches of 7 male and 7 female being slaughtered at 8, 16 and 24 wk of age, and contents of crude protein and crude fat, water absorption capacity, pH and colour of breast muscles were determined 48 h after slaughter; and juiciness, crispness, and desirability and intensity of taste were assessed organoleptically after heat treatment. The results are tabulated in detail for the sexes separately and together. Breed differences were overshadowed by age differences. The overall conclusion was that the best quality was obtained at 16 wk of age. SKK

### 32

[The L. D. C. slaughterhouse for poultry and rabbits in Sable.]

Baron, J.

*RTVA* 20 (167) 44-47 (1981) [Fr]

The high-capacity L. D. C. poultry and rabbit slaughterhouse (throughput 300 t of carcasses/wk) at Sable is described. Aspects considered include: supply of birds and rabbits, stunning; plucking, etc. as appropriate; evisceration; cooling; cold storage; cutting; hygiene; veterinary inspection; and marketing. AJDW

### 33

[Experimental purification of poultry abattoir waste waters by a peat bed, in an abattoir at Pizancon.]

Bonhomme, C.

*RTVA* 20 (167) 59-63, 65, 67 (1981) [Fr]

### 34

[Technical and veterinary-sanitation aspects of present-day poultry slaughter and processing lines.]

Bogojeic, M.

*Tehnologija Mesa* 21 (7/8) 229-232 (1980) [Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Equipment and methods used for slaughter and processing of poultry are described, with reference to transport, reception, slaughter, scalding, plucking, evisceration, chilling, packaging, and disposal of wastes.

### 35

Health laws and regulations - Federal Republic of Germany.

World Health Organization

*International Digest of Health Legislation* 30 (3) 548-558 (1979) [En] [Geneva, Switzerland]

A selection of Federal Republic of Germany health laws and regulations is presented including the following which relate to food hygiene (pp. 554-555): Ordinance of 13 June 1978 on plant protection products in or on foods of plant origin; First Ordinance of 29 Aug. 1978 amending the Ordinance on the max. permissible amounts of pesticides in foods of animal origin; Notice of 4 July 1978 promulgating the revised version of the Meat Ordinance; and Ordinance of 27 July 1978 amending the Poultry Meat Inspection Ordinance and the Ordinance on charges in connection with poultry meat hygiene. VJG

### 36

[Sausages from poultry meat. Cooked sausages: sliced sausages.] Wurstwaren aus Geflügelfleisch.

Brühwurst: Aufschnittware.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

*German Democratic Republic Standard*

TGL 34777/01, 12pp. (1978) [De]

This standard applies to cooked poultry (including chicken and turkey) meat sausages, and covers terminology, categorization (13 grades), ingredients, sensory quality, degree of meat comminution, and casing. Specific requirements include: moisture content, max. 46.5-75.5%; fat, max. 5.5-45%; protein, min. 10-17%; NaCl, max. 1.6-2.0%; and calorific value, 500-1900 kJ/100 g. The standard also covers sampling, testing, packaging (natural vegetable or synthetic parchment or vacuum packaged), transport (at 0-20°C) and storage (short term at 0-6°C, out of direct daylight). KME

### 37

[Sausages from poultry meat. Boiling sausages (Brühwurst), frankfurter-style sausages and sausages for grilling.] Wurstwaren aus Geflügelfleisch.

Brühwurst: Würstchen und Rostbratwürste.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

*German Democratic Republic Standard*

TGL 34777/02, 8pp. (1978) [De]

This standard applies to cooked poultry meat sausage and covers terminology, categorization (7 grades) and sensory quality. Specific requirements include: moisture content, max. 59.5-61%; fat, max. 29.5-31.5%; protein, max. 9-10%; NaCl, max. 2%; and calorific value, 1300-1400 kJ/100 g. The standard also covers sampling, testing, packaging (natural vegetable, or synthetic parchment), transport (at 0-20°C), and storage (short term at 0-6°C, out of direct daylight.) KME

## 38

[Sensory quality testing. Evaluation of boiling sausages (Brühwurst) from poultry meat: sliced sausages.] Sensorische Qualitätsprüfung. Beurteilung von Brühwurst aus Geflügelfleisch. Aufschnittware. German Democratic Republic, Institut für Fleischwirtschaft der DDR  
**German Democratic Republic Standard**  
TGL 34779/01, 7pp. (1978) [De]

This standard applies to products given in German Democratic Republic Standard TGL 34777/01 [see preceding abstr.]. A 5-point grading system is given for general composition, appearance, odour and taste. KME

## 39

[Sensory quality testing. Evaluation of boiling sausages (Brühwurst) from poultry meat. Small sausages and grilling sausages.] Sensorische Qualitätsprüfung Beurteilung von Brühwurst aus Geflügelfleisch: Würstchen und Rostbratwürste. German Democratic Republic, Institut für Fleischwirtschaft der DDR  
**German Democratic Republic Standard**  
TGL 34779/02, 4pp. (1978) [De]

This standard applies to products given in German Democratic Republic Standard TGL 34777/02 [see preceding abstr.]. A 5-point grading system is given for general composition, appearance, odour and taste. KME

## 40

[Sausages made from poultry meat. Cooked sausage (Kochwurst): liver sausage (Leberwurst).] Wurstwaren aus Geflügelfleisch. Kochwurst: Leberwürste. German Democratic Republic, Institut für Fleischwirtschaft der DDR  
**German Democratic Republic Standard TGL 34778/01**, 5pp. (1978) [De]

This standard applies to liver sausages (incorporating pork meat) and covers terminology, categorization (2 types), ingredients and additives, and sensory properties. Specific requirements include: moisture content, max. 52-53%; fat, max. 33%; protein, min. 12.5-13.5%; NaCl, max. 2%; and calorific value, 1450-1500 kJ/100 g. The standard also stipulates packaging (natural vegetable or synthetic parchment), transport (0-20°C), and storage (short term at 0-6°C, out of direct daylight). KME

## 41

[Sensory quality testing. Evaluation of cooked sausage (Kochwurst) from poultry meat: blood sausages.] Sensorische Qualitätsprüfung. Beurteilung von Kochwurst aus Geflügelfleisch: Blutwürste. German Democratic Republic, Institut für Fleischwirtschaft der DDR  
**German Democratic Republic Standard**  
TGL 34780/02, 4pp. (1978) [De]

This standard applies to 6 types of cooked sausage (Blutwurst) made from ingredients including poultry meat. It covers sampling and testing for sensory quality and gives weighting factors. Meat content shall be from >10-60% according.

## 42

**International legislation - European Communities.**  
World Health Organization  
**International Digest of Health Legislation** 31 (2) 389-405 (1980) [En] [Geneva, Switzerland]

A selection of European Communities health laws and regulations is presented including the following which relate to food hygiene (p. 403): Council Directive No. 80/214/EEC of 22 Jan. 1980 amending Directive 77/99/EEC on health problems affecting intra-Community trade in meat products; and Council Directive No. 80/216/EEC of 22 Jan. 1980 amending Directive No. 71/118/EEC on health problems affecting trade in fresh poultry meat. VJG

## 43

**Barcoding presents problems to egg pack makers.**  
Anon.

**Poultry International** 19 (13) 58, 60, 62, 110, 114 (1980) [En, de, fr, es, it, ja, ar]

Problems with application of optically-scannable bar codes to egg packs are discussed; these are due to the relatively low-cost rough-finish pack material and non-sophisticated printing normally used on egg packs. Positioning of the bar code on the packs is also discussed. Stick-on labels are unlikely to be an acceptable solution, due to the likelihood of their being damaged or becoming attached to other items. Problems with application of bar codes to packs for poultry products are comparatively slight. AJDW

## 44

**Profits up in smoke.**  
Philip, M.

**Catering and Hotel Management** 53 (10) 21-22 (1981) [En]

A discussion of the processes and equipment involved in small-scale smoking, applicable to most meat, fish, and poultry is presented. The microbiological and sensory acceptability of such products is considered, e.g. smoked salmon, as a chilled or frozen product containing 5.5 and 3.0% salt was evaluated, and both frozen samples were rated as excellent microbiologically and sensorily, whereas only the chilled product with 5.5% NaCl was acceptable, and it was only rated as 'good'. LH

## 45

**Proceedings of the Maryland Nutrition Conference for Feed Manufacturers, March 19 & 20, 1981.**  
[Conference proceedings]

United States of America, University of Maryland; United States of America, Maryland Feed Industry Council Inc.; United States of America, American Feed Manufacturers Association  
iv + 106pp. (1981) [many ref. En] Maryland, USA; University of Maryland. Price \$2.50; £2.55

This publication gives the full text of papers presented at this symposium, including the following which give information on quality of eggs or poultry carcasses. Effects of early nutrient retention on broiler breeder reproduction, by J. H. Soares, Jr., M. A. Ottinger, P. Laurans & J. T. Allen (pp. 15-18, 5 ref.). Feeding the pullet for early maturity, by S. Leeson (pp. 18-25, 13 ref.). Influence of con-

## 46

**Sausage from poultry meat- A review. [Review]**  
Mahapatra, C. M.

**Indian Poultry Gazette** 65 (1) 1-10 (1981) [50 ref. En]  
[Cent. Avian Res. Inst., Izatnagar- 243 122, India]

After a brief review of the existing knowledge on production of sausages from poultry meat, it is concluded that good chicken sausages can be manufactured from the meat of spent hens. The product should contain 10-11% animal protein. 3 standard recipes are given. CFTRI

## 47

**A convenient surface plate method for bacteriological examination of poultry.**

Thomas, Y. O.; Lulves, W. J.; Kraft, A. A.

**Journal of Food Science** 46 (6) 1951-1952 (1981) [En]  
[Dep. of Food Tech., Iowa State Univ., Ames, Iowa 50011, USA]

The surface plate method was compared with the more conventional pour plate method for the enumeration of mesophiles, psychrotrophs, lactobacilli, coliforms, and streptococci on poultry. Surface plates were prepared by drying freshly poured plates at 37°C for 3 days. These plates were stored at 5°C until 4 h before use, when they were re-dried at 37°C. Pour plates were made using standard methods. The 2 methods were highly correlated, but there was a significant difference between the surface plate and pour plate methods for coliforms and psychrotrophic counts. Higher counts were obtained with the surface plate technique for these organisms. IFT

## 48

**[Staphylococci in a poultry slaughterhouse.]**  
Jacobsen, C.

**Dansk Veterinaertidsskrift** 62 (16) 817-824 (1979)

[2 ref. Da][Danpo A/S, 6580 Vamdrup, Denmark]

In order to establish the incidence and magnitude of staphylococcal contamination of poultry and poultry meat products, during various periods between Nov. 1976 and March 1979 staphylococcal counts were taken in the lungs, throat and in samples of neck skin from chickens after slaughter, after the 1st and 2nd mechanical plucking operations and at the packaging stage. Additionally, the bacterial load (total count, staphylococci, faecal streptococci, coliforms) was determined in samples of comminuted meat. Results are tabulated. The overall conclusions were: about 80% of chickens arriving at the slaughterhouse have staphylococcal infection of the respiratory tract; the organisms are not of pathogenic origin; their presence in poultry meat products is not indicative of unsatisfactory processing hygiene; and they do not normally constitute a health hazard. HBr

## 49

**[Poultry processing.]**

Armer International Co.

**Japanese Examined Patent** 5 623 578 (1981) [Ja]

Poultry meat is tenderized by injecting a suspension of edible fat and the sodium or potassium salt of a polyphosphoric acid. IFT

## 50

**[Hygienic tests in Danish poultry slaughterhouses.]**  
Suhr-Jessen, T.

**Dansk Veterinaertidsskrift** 62 (19) 925-930 (1979) [Da]

After an outline of the different processes involved in the slaughter and dressing of poultry (scalding, plucking, hanging, evisceration, washing, cooling, packaging), the author outlines the method of bacteriological control (inoculation, droplet technique), and compares the advantages and disadvantages (precision, ease of use, costs, duration of test, etc.) of 3 different methods of controlling the cleaning processes, viz swabs, agar sausage/contact plates and tapes (also direct contact). Although all 3 methods are applicable, choice will depend on the emphasis placed on the relative merits of the results. HBr

## 51

**Effect of pH on TBA values of ground raw poultry meat.**

Chen, T. C.; Waimaleongora-Ek, C.

**Journal of Food Science** 46 (6) 1946-1947 (1981) [En]  
[MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Hand-deboned raw broiler meat was ground through a meat grinder and adjusted to pH values of approx. 3, 5, 7, and 9. The prepared samples along with the controls were covered and stored at 2-4°C. The 2-thiobarbituric acid (TBA) values of the samples were measured immediately after sample preparation and during refrigerated storage for a period of 14 days. The pH values affected the lipid oxidation of ground raw meat as measured by the TBA test. The lower the pH values, the stronger the pro-oxidant affect. Adjusting the pH values of ground raw poultry meat to neutral or alkaline slowed the increase in TBA values. IFT

## 52

**World poultry production: where and how? [Book]**

Scheele, C. W.; Veerkamp, C. H. (Netherlands, Spelderholt Institute for Poultry Research) (Editors) v + 119pp. ISBN 90-9000198-0 (1981) [many ref. En] Beekbergen, Netherlands; Spelderholt Institute for Poultry Research

This publication gives the full text of papers presented at this Jubilee symposium, held in Apeldoorn, 20 May 1981, on the occasion of the 60th anniversary of the Spelderholt Institute for Poultry Research. Papers presented were: Historical view on the occasion of the 60th anniversary of Spelderholt Institute for Poultry Research, by J. Folkerts (pp. 3-15). The world's poultry production: where and how? by D. de Zeeuw (pp. 21-25). Trends and interdependences in international egg and poultry markets, by R. Bröcker (pp. 27-37). Poultry production in relation to energy utilization and environment, by A. J. H. van Es (pp. 39-53, many ref.). Adaptation of poultry to modern practices, by H. S. Siegel (pp. 55-66, many ref.). Poultry production in relation to world food situation, by G. de Bakker (pp. 67-79, 5 ref.). Poultry products production, now and in future, in Europe and USA, by J. Charbonneau (pp. 81-89, 4 ref.). Appendices cover Objectives of research at Spelderholt Institute for Poultry Research (pp. 91-111); and Publications of the Spelderholt Institute for Poultry Research issued in 1980 and up to May 1981 (pp. 113-119). AJDW

## 53

[Evaluation of the limit of bactericidal activity and the antibacterial efficacy of Bromocet and Tego-51 for disinfection of poultry abattoirs.]

Stanescu, V.; Klemm, W.; Laslo, C.

*Revista de Cresterea Animalelor* 31 (1) 44-49 (1981)

[6 ref. Ro, en, fr, ru] [Fac. de Zootechnie & Med. Vet., Cluj-Napoca, Romania]

Comparative studies on the efficacy of the Romanian disinfectant Bromocet and the imported disinfectant Tego-51 are described. Trials with pure cultures of *Staphylococcus aureus* and *Bacillus mesentericus* showed Bromocet to be more efficient than Tego-51. In trials on contaminated stainless steel sheets, Bromocet gave greater reductions of total counts, aerobic spore-former counts and coliform counts than Tego-51. Activities of the 2 disinfectants against salmonellae were similar. Effects of dilution, temp. and contact time on the bactericidal activity of Bromocet are discussed. Use of a 1% solution at 20°C for  $\geq 5$  min is recommended for applications in poultry abattoirs. AJDW

## 54

Tendon pulling.

Batts, T. (Swift & Co.)

*United States Patent* 4 291 434 (1981) [En]

An improved method for pulling tendons from the legs of poultry carcasses is described in which the lower legs are broken; oppositely directed shearing forces are then applied to the lower legs to tear the skin, sever each foot and to pull tendons from the upper leg of the carcass. IFT

## 55

Poultry picking.

Mil, M. P. G. van (Stork PMT BV)

*United States Patent* 4 292 709 (1981) [En]

A picking element comprises a beaker-shaped support; the support is rotated about its centre line, and has a cylindrical casing surface and end face area with picking fingers. IFT

## 56

[Poultry: the consumer and quality.]

Risse, J.

*RTVA* 20 (170) 5, 7-9 (1981) [Fr]

Aspects considered in this general discussion include: consumer opinions and expectations; organoleptic properties; the importance of freshness; effects of feed, slaughter and post-slaughter operations (e.g. scalding, plucking) on quality; hygiene aspects; nutritional value and composition (protein, fat, other constituents, energy); and effects of preservation methods and cooking on nutritional value. AJDW

## 57

Foodservice supplier braves retail market with gourmet frozens.

Feminis, S. K.

*Food Product Development* 14 (7) 20, 22 (1980) [En]

Serenade Foods, Inc., of Milford, Indiana, a food service supplier is launching a retail line of Maple Leaf

frozen prepared entrees to supermarkets and speciality shops in at least 10 major cities. The 5 premiere items in the line are: chicken kiev, chicken cordon bleu, rock cornish game hen stuffed with brown and wild rice dressing, chicken parmigiana and a roasted half duckling with orange sauce. The entrees are made of premium meat, spices and seasonings, and are packaged in a heat sealed plastics bag inside a paperboard carton. Conventional oven cooking times range from 30-40 min (the game hen takes 50-60 min). Microwave instructions are given. VJG

## 58

[Variations in the mass of goose eggs during storage.]

Lazar, V.; Spacek, F.; Kriz, L.

*Acta Universitatis Agriculturae Facultas Agronomica, Brno* 25 (4) 141-147 (1977) [11 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

Changes in wt. were recorded during 14 days' storage of 2091 goose eggs. Tabulated results showed large variations in wt. loss ( $> 20\%$ ) and highly significant differences in wt. of eggs stored for 1 day or  $\geq 3$  days. These differences became more pronounced during storage; after 12 days storage all the eggs showed significant to highly significant wt. losses, confirming the Czechoslovak standard CSN 46 6409 requirement for a max. of 7 days' storage. RM

## 59

[Variations in the weight of goose eggs with laying cycles and years.]

Lazar, V.; Spacek, F.; Kriz, L.

*Acta Universitatis Agriculturae Facultas Agronomica, Brno* 26 (3) 175-180 (1978) [12 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

11 512 goose eggs (Rhine breed) laid during 4 laying cycles (2 yr) were individually weighed. Tabulated results revealed the following wt. ranges (g) for cycles 1 to 4: 127.27-140.65; 168.87-171.11; 163.48-172.89; and 179.35-185.90. Most samples were within the wt. range 130-179 g in the first yr, 160-189 in the second yr. 90.28% complied with the Czechoslovakian Standard 46 6409; 8.24% were below and 1.48% above the standard requirements. RM

## 60

Poultry pinning and de-hairing machine.

Conaway, E. T.

*United States Patent* 4 282 632 (1981) [En]

Apparatus in the form of a series of elongated columnar members supporting a number of poultry pinning and de-hairing flexible fingers is described; the arrangement enables free-form inflect engagement with the various areas of a poultry carcass as the carcasses move along the processing line. IFT

61

**Method for preparing molded poultry product.**

Lewis, R.

**United States Patent 4 285 980 (1981) [En]**

Process is described for preparing a moulded poultry product using a mould device with the configuration of cooked poultry. The mould comprises 2 sectional members each having an internal contour of a portion of the configuration; assembly of the sectional members forms an internal surface having the configuration of whole cooked poultry. A flexible bag within the assembled sectional members assumes the shape of the internal surface when poultry meat is passed into the bag. The final product has the self-retaining shape of cooked poultry, is boneless and skinless, and comprises only poultry, without other meats or stuffings. The product also has separate white and dark meat sections that conform to these sections in conventionally cooked poultry. A preferred embodiment utilizes raw turkey meat. RAW

62

**Poultry inspection apparatus and method.**

House, J. B. (Stork Gamco Inc.)

**United States Patent 4 283 813 (1981) [En]**

Poultry inspection method and apparatus are described in which birds, hung head downwards and back forwards, move toward an inspection station where they are mechanically turned and rotated to permit overall inspection. IFT

63

**Factors affecting adhesion of coating to poultry skin: effects of various protein and gum sources in the coating composition.**

Suderman, D. R.; Wiker, J.; Cunningham, F. E.

**Journal of Food Science 46 (4) 1010-1011 (1981) [22 ref. En] [Dep. of Anim. Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66506, USA]**

The aim of this study was to determine effects of protein and gum sources and amounts on the adhesion of a commercial breading mix to poultry skin. Protein sources used were whey, soy, nonfat dry milk, egg albumen, and gelatin. Gum sources were sodium carboxymethyl cellulose (CMC), guar, tragacanth, and xanthan. Among the proteins, gelatin and egg albumen most effectively improved adhesion. For all gums studied, only CMC was significantly better at improving adhesion. Increased levels of gums and proteins in breading did not affect adhesion significantly. IFT

64

**Quality control in small plants. A guide for meat and poultry processors. [Booklet]**

United States of America, United States Department of Agriculture, Food Safety and Inspection Service

**United States Department of Agriculture, Agriculture Handbook No. 586, 19pp. (1981) [En]**

This guidebook was prepared for operators of small meat or poultry processing plants. It discusses the concept of quality control and the USDA Voluntary Total Quality Control (TQC) Inspection System, and explains how the TQC Inspection System relates to the meat and poultry inspection programme and to small processing operations. RM

65

**A new screening method for the detection of antibiotic residues in meat and poultry tissues.**

Johnston, R. W.; Reamer, R. H.; Harris, E. W.; Fugate, H. G.; Schwab, B.

**Journal of Food Protection 44 (11) 828-831 (1981) [9 ref. En] [Food Safety & Quality Service, USDA, Washington DC 20205, USA]**

A simplified procedure is described for screening meat and poultry tissues for the presence of antibiotic residues. The method involved inserting a cotton swab directly into meat or poultry tissues, allowing it to absorb tissues fluids. The swab is then removed and placed on a test plate using Antibiotic Medium No. 5 (BBL) and a seed layer of *Bacillus subtilis* ATCC 6633 spores. The plate is incubated overnight at 29°C, then observed for evidence of inhibition around the swab. The method was compared with the conventional bioassay procedures. Of a total 1780 tissues tested, the screening procedure was either in agreement with or detected inhibition not found by the conventional procedures in 99.4% of the samples. The test was shown to have equal sensitivity to conventional procedures for detection of chlortetracycline, oxytetracycline, tetracycline, erythromycin, neomycin, penicillin, streptomycin and tylosin. AS

66

**[The French dairy wholesale trade.]**

Anon.

**Technique Laitiere No. 960, 34-36 (1981) [Fr]**

French wholesale trade in dairy products, poultry, eggs etc. is described, with particular reference to dairy products. Wholesalers employ 3 methods of sale: commission sale, where the manufacturer remains the owner of the product and bears the risks right through to the final transaction; sale direct from the delivery vehicle, the load of which is made up by the driver according to his estimates of customers' requirements; sale based on advance orders, with consignments prepared at the depot for rapid unloading. Wholesalers are now threatened by the increasing concentration both of the milk-processing and of the retailing sectors. ADL

67

**Roaster tray.**

Taylor, A. P.

**United States Patent 4 291 616 (1981) [En]**

The roaster tray is a cooking device used for roasting/baking and serving meats, poultry or other foods. It comprises a tray supported by a vessel, that fit together during cooking; any liquids produced during cooking of the foods are contained in the vessel. After cooking, the tray is separated from the vessel and used as a tray/platter for the cooked food while it is carved or served. AS

68

**Surface fouling - an unsolved problem in heat transfer.**

Mottola, A. C.

**ASAE Paper No. 80-6516, 22pp. (1980) [15 ref. En] [Agric. Res. Cent., USDA-SEA-AR, PO Box 5677, Athens, Georgia 30613, USA]**

Rating a heat exchanger to transfer thermal energy

from a hot fluid to a cold one requires a knowledge of film coeff. and reliable surface fouling resistances. For the food processing industries, particularly for poultry processing, fouling data is lacking. This paper provides an analytical model for predicting the rate of fouling and a method for obtaining terminal fouling resistances after a period of operation. AS

## 69

[Microbiological studies of textured milk protein recently produced in Poland and of high-protein food products containing the texturate as meat substitute.]  
Szydlowski, A.; Ogonowska, D.  
*Roczniki Państwowego Zakładu Higieny* 31 (3) 293-300 (1980) [8 ref. Pl, ru, en] [Cent. Osrodek Badawczo-Rozwojowy Przemyslu Gastronomicznego & Artykulow Spozywczych 'Spolem' CZSS, Lodz, Poland]

3 batches of textured milk protein manufactured by the Provincial Dairy Co-operative in Olsztyn, Poland [presumably] by the procedure described by Poznanski et al. [FSTA (1975) 7 8P1881] were each divided into 2 parts, of which (i) was stored at 4°C, and (ii) the other was frozen at -18°C and stored at this temp. (i) was examined on the 1st, 3rd and 6th days of storage, and (ii) was examined directly after freezing and then once/month for 8 months. 'Roman roast' and poultry sausages, each made with 15, 20, 30 or 40% (i) or (ii) was stored at 4°C after preparation and examined on the 1st, 3rd, 6th and 9th days of storage. Total numbers of aerobic microorganisms; incidence of *Proteus*; titres of coliforms, *Escherichia coli*, anaerobic bacilli, pathogenic staphylococci, and enterococci; numbers of yeasts and moulds; and incidence of *Salmonella* and *Shigella* were determined at each examination. The results are tabulated in detail. The main conclusions were that (i) and (ii) fully satisfied microbiological standards of purity throughout their respective storages; and that the dishes made from them were equally satisfactory in storage for <6 days. SKK

## 70

Sensory attributes and Instron measurements of reduced-nitrite poultry frankfurters with sorbic acid or potassium sorbate.  
Chambers, E. IV; Bowers, J. A.; Prusa, K.; Craig, J.  
*Journal of Food Science* 47 (1) 207-209 (1982) [En]  
[Dep. of Foods & Nutr., Kansas State Univ., Manhattan, Kansas 66506, USA]

Poultry frankfurters (0 and 40 p.p.m. nitrite) with sorbic acid or potassium sorbate were studied. Flavour characteristics were influenced by nitrite but not by ascorbic acid or potassium sorbate. Frankfurters with sorbic acid were softer, and those with potassium sorbate were firmer than those without. Nitrite alone increased firmness. Sorbic acid appeared to counteract that increased firmness, and potassium sorbate enhanced the increase in firmness when those compounds were used in combination with nitrite in the poultry frankfurters. Simulated-teeth attachments for the Instron gave results similar to sensory firmness scores. Frankfurters with sorbic acid added had lower pH than frankfurters from other treatments. JFT

## 71

[Inhibition of spoilage of and pathogenic bacteria on fresh and vacuum packaged poultry by means of sorbic acid and potassium sorbate.]

Robach, M. C.

*Tecnologie Alimentari* 4 (9) 42-43 (1981) [8 ref. It]  
[Monsanto Co., St. Louis, Missouri, USA]

Use of sorbic acid for control of microbial growth on poultry carcasses or pieces is discussed on the basis of literature data showing sorbic acid to inhibit

multiplication of *Salmonellae*, *Staphylococcus aureus*, *Escherichia coli* and psychrophilic spoilage bacteria. Organoleptic properties are not impaired and sorbic acid residues on the surface of the poultry may be eliminated by rinsing. AJDW

## 72

Use of microwaves to extend shelf life of refrigerated poultry.

Cunningham, F. E.; Francis, C.

*Feedstuffs* 54 (2) 23-24 (1982) [5 ref. En] [Dep. of Anim. Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66506, USA]

Several experiments are described (graphs and tables included), which studied the effect of subcooking microwave treatments on bacterial load of fresh poultry and poultry products, with special regard to psychrotrophs. Subsequent refrigerated shelf-life of these products was extended by these treatments. Short bursts (20-40 s) of radiation seem to be the most effective in killing psychrotrophic spoilage bacteria e.g. *Pseudomonas* spp., coliforms, *Moraxella acinetobacter*, *Flavobacterium devorans*, *Alcaligenes faecalis*, etc., and allowing poultry to be held in the raw state for longer than normal at 4°C. LH

## 73

Microbiological problems associated with refrigerated poultry. [Lecture]

McMeekin, T. A.; Thomas, C. J.

*CSIRO Food Research Quarterly* 40 (3/4) 141-149 (1980) [43 ref. En] [Dep. of Agric. Sci., Univ. of Tasmania, Hobart, Tasmania, Australia]

The following topics are discussed: psychrotrophic microorganisms; contamination of the product with psychrotrophs; development and metabolism of psychrotrophs on the carcass; and evaluation of spoilage and prediction of shelf life. [See FSTA (1982) 14 6E226.] VJG

## 74

[Occurrence of enterobacteria on the surface of poultry carcasses.]

Kontor, A.

*Magyar Allatorvosok Lapja* 36 (9) 634-637 (1981) [28 ref. Hu, en, de, ru] [MEM Elelmiszeripari Higieniai Ellenörzö Szolgalata, Postafiock 13, 1453 Budapest, Hungary]

Bacteriological examination (swab and rinsing methods) of the surface of poultry carcasses showed that 90% of enterobacteria present consisted of coliforms ( $10^4$ - $10^5$ /cm $^2$ ). Highest values were obtained after evisceration, followed by significant decreases after pre-cooling and freezing. ESK

## 75

Device for removing feathers from game fowl [and poultry].

Herolzer, R. H.

United States Patent 4 288 888 (1981) [En]

## 76

Bacteriological studies on the length of chill period, different additives and cold storage on processed chicks.

El-Erian, A. F. M.; Attia, F. M.; Shamara, M. I.

*Journal of the College of Agriculture. University of Riyadh* 1, 13-22 (1979) [6 ref. En; ar] [Coll. of Agric., Univ. of Riyadh, Riyadh, Saudi Arabia]

Fayoumi and Nichols chickens were used to study the effect of the length of chilling and of sodium tripolyphosphate, NaCl and NaOCl on the total bacterial count on the skin of processed poultry during 24 and 72 h at 5°C and 1 and 2 wk storage at -18°C. Total counts increased during refrigerated storage, but decreased during frozen storage. They were not consistently affected by the various additives. RM

## 77

Some factors affecting change in weight of cooled carcasses.

Attia, F. M.; Shamara, M. I.

*Journal of the College of Agriculture. University of Riyadh* 2, 27-34 (1980) [10 ref. En, ar] [Fac. of Agric., Al-Azhar Univ., Cairo, Egypt]

Storage of Nichols and Fayoumi chicken carcasses subjected to different cooling treatments revealed that changes in carcass wt were related to poultry breed, age (75, 185 and 507 days), chemical composition, chilling period (4, 6 or 8 h for young birds only), and length of cold storage (48 and 72 h under refrigeration, 1 and 2 wk frozen storage). RM

## 78

[Study of use of a physical method (ultrasonics) and disinfectants in decontamination of water used in poultry meat production.]

Ionova, I.; Kunev, Zh.; Mladenov, M.; Dyakov, G.

*Veterinarnomeditsinski Nauki* 18 (4) 99-105 (1981) [9 ref. Bg, ru, en] [Tsentralen Nauchnoizsled. Vet. Med. Inst., Sofia, Bulgaria]

Ultrasonic treatment at 2000 kHz for  $\leq 9$  min was not effective (in laboratory experiments) in destroying *Salmonella typhimurium* or *S. oranienburg* dispersed in water at resp.  $1.4-2.7 \times 10^6$  or  $0.8-1.2 \times 10^6$  cells/ml; nor was it effective in decontaminating water from a poultry carcass cooling tank, containing  $12-35 \times 10^6$  microorganisms/ml. The iodophor Inkozan at 1:10 000 concn. in water destroyed within 1 min suspensions of *S. agona*, *S. typhimurium*, *S. oranienburg*, *S. enteritidis*, and *Escherichia coli* at  $3.5-7.5 \times 10^6$  cells/ml, but Khalamid (sodium salt of *p*-toluene sulphate trichloramine) was ineffective in the same concn. even

in 15 min. Inkozan at 1:1000, and Iomil C iodophor at 0.2 and 0.4% fully eliminated bacteria present at  $0.12-28 \times 10^6$ /ml in water from a poultry carcass cooling tank after 5-min exposure, and, except Iomil C at 0.4%, did not affect organoleptic quality of carcasses immersed in such water. However, neither these preparations nor Khalamid and Chloramine were capable, when added to the water, of destroying contaminants on the surface of experimentally contaminated carcasses. SKK

## 79

[Poultry and rabbit feet.]

Drieux, H.

*RTVA* 20 (170) 9-11 (1981) [Fr]

Cases in which poultry were marketed with their feet attached are considered in relation to French legislation prohibiting this, and a subsequent circular permitting cutting the feet at a max. of 5 cm below the joint. Problems of reconciling these 2 differing instructions are discussed, with special reference to the small but significant excess price/kg edible material paid by consumers receiving poultry with feet. Similar aspects of marketing of poultry carcasses with necks intact are also considered. Hygienic objections to the widespread practice of marketing of skinned rabbit carcasses with the non-skinned feet attached are also presented.

AJDW

## 80

[Nutritional value of protein isolate from poultry by-products.]

Grigorashvili, G. Z.; Moniava, I. I.; Maglaperidze, N. D.; Beliashvili, N. N.

*Voprosy Pitaniya* No. 5, 39-42 (1981) [17 ref. Ru, en] [Nauchno-issled. Inst. Sanitarii i Gigienny im G. M. Natadze Min. Zdravookhraneniya Gruzinskoi SSR, Tbilisi, USSR]

Animal feeding trials were conducted on a protein isolate from poultry by-products (stomach and intestines) to assess its nutritional value. Tabulated data include the amino acid [AA] composition of the protein isolate (determined using a Hitachi analyser), AA composition and score for the isolate in comparison with casein and the FAO/WHO standard, and nutritional value of the isolate compared with casein. It is concluded that the isolate is suitable for human nutrition. The relative nutritional value of the isolate was found to be 85.2% of that of casein. RAW

## 81

[Hygiene status of foods of animal origin.]

Hygienischer Status von Lebensmitteln tierischer Herkunft.

Kniewallner, K.

*Ernährung* 5 (10) 463-467 (1981) [De, en] [Inst. für Fleischhygiene, Fleischtech. und Lebensmittelkunde, Veterinärmed. Univ. Wien, Vienna, Austria]

Extensive trials were performed on the hygienic standard of various foods of animal origin, including samples of Austrian and foreign origins. Data were tabulated on: average microbial counts/g sample, with relevant % samples, for commercially available minced

meat samples, covering (i) aerobic microbial count, (ii) pseudomonads, (iii) coliforms, (iv) faecal coliforms, (v) enterobacteriaceae, (vi) enterococci, (vii) coagulase-positive staphylococci and (viii) micrococci; average microbial count/cm<sup>2</sup> skin surface or /ml rinsing liquid for fresh poultry stored at 5°C for 1-7 days, covering (i), (ii), (iv) and (v) for skin surface and abdominal cavity in oven-ready and skinned samples; average counts of (i), (ii), (iv) and (v) (skin surface and abdominal cavity) of poultry carcasses; and salmonella detection in 450 poultry carcasses, covering location (skin surface, abdominal cavity or other). Results are discussed and reference made to contamination risks. RAW

## 82

### Method and apparatus for cutting poultry.

Hawk, C. A.; Lerner, H.

*United States Patent* 4 306 335 (1981) [En]

Apparatus and a method are described for cutting poultry, previously cut into front halves and rear halves, where each half is automatically and simultaneously cut into a desired number of pieces; a bucket conveyor is synchronized with the cutting operations to receive a complete cut-up chicken in a single bucket. AS

## 83

### Dual feed conveyor in gizzard processing machine.

Hill, C. J.

*United States Patent* 4 302 867 (1981) [En]

## 84

### Cook-in film containing a blend of ionomer and elastomer.

Lustig, S.; Vicik, S. J. (Union Carbide Corp.)

*United States Patent* 4 293 664 (1981) [En]

A stretchable monolayer film for packaging and cooling poultry, consists of a blend of an ionomer and an elastomer. AS

## 85

### Wax applicator for defeathering fowl.

Sullivan, T. B.

*United States Patent* 4 307 487 (1981) [En]

## 86

### [Chemical composition of the breast and thigh meat in culled breeding geese.]

Hrduz, J.

*Acta Universitatis Agriculturae Facultas*

*Agronomica, Brno* 25 (3) 165-171 (1977) [9 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

This paper presents data for the chemical composition of the breast and thigh meat in geese culled from breeding, and the effect of finishing rations with various N and energy levels on such birds. Results showed significant differences in composition compared with control birds, but the changes did not correspond to the composition of the feed: the quality of the feed had no significant effect on the chemical composition of the carcasses. RM

## 87

### [Separate feeding of goslings by sex.]

Spacek, F.; Lazar, V.; Kriz, L.; Krapek, L.; Pavlicek, J.

*Acta Universitatis Agriculturae Facultas*

*Agronomica, Brno* 26 (4) 147-155 (1978) [10 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Brno, Czechoslovakia]

Feeding goslings separately by sex shortened the fattening period for male birds by 1 wk. Analysis of carcass characteristics showed better quality for female birds, with 16.38% breast meat + skin vs. 13.98 for male birds (or 10.80 vs. 8.50 for skinless meat), as well as a 1.7% advantage in dressing % (76.2 vs 74.5%). RM

## 88

### [Meat production from White Pekin ducks.]

Einarsson, E. J.

*Meldinger fra Norges Landbrukshogskole* 60 (19) 1-16 (1981) [20 ref. No, en] [Inst. for Fjorfe og Pelsdyr, Norges Landbrukshogskole, As-NLH, Norway]

Extensive feeding trials with White Pekin ducks are described; aspects considered include use of concentrate mixtures, restricted feeding, adjustment of the protein/energy ratio of the diet, and feeding fish scraps to the ducks. Data are included for live wt, feed consumption, carcass wt., meat and skin + fat thickness of the breast cut, DM, ash, protein and fat contents of the meat, and fatty acid composition of the lipids. Increasing the protein/energy ratio in the diet reduced fat content of the carcass by 3.3%; reduction of slaughter age reduced fat content only slightly, and also reduced the breast muscle % in the carcass. Feeding diets containing fish scraps had no significant effect on organoleptic properties; it slightly increased C18:2 and slightly decreased C18:1 fatty acid concn. in the carcass lipids. AJDW

## 89

### [Occurrence of pathogenic *Escherichia coli* on the surface of poultry carcasses at various stages of processing.]

Kontor, A.; Baron, F.

*Magyar Allatorvosok Lapja* 36 (9) 638-642 (1981)

[47 ref. Hu, en, de, ru] [Hygienic Control Service of the Food Ind., 1453 Budapest, Postafiock 13, Hungary]

Of 315 samples from the surface of poultry carcasses

at various stages of processing (before evisceration, after evisceration, after washing, before pre-cooking, after pre-cooling, before packaging, after packaging and on frozen carcasses), 138 (43.8%) contained pathogenic *Escherichia coli* (67 enteritis-causing and 71 other strains pathogenic to humans. No correlation could be found between the occurrence of pathogenic *E. coli* and the total number of coliforms. ESK

## 90

[Evaluation of poultry meat.] Neue Erkenntnisse zur Bewertung von Geflügelfleisch.  
Scholtysek, S.

*Züchtungskunde* 53 (4) 276-282 (1981) [7 ref. De, en, fr, ru] [Lehrstuhl für Kleintierzucht, Inst. für Tierhaltung und Tierzüchtung, Univ. Hohenheim, 7000 Stuttgart 70, Federal Republic of Germany]

Aspects considered (with the aid of tables of literature data) in this discussion of poultry quality include: nutrient contents of leg muscles of various slaughter animals; effects of age on live wt. and carcass yield of chickens and turkeys; % yields of various cuts from poultry carcasses; amino acid compositions of red and white poultry meat; effects of age and cut on the fat and DM content of turkey meat; total fat, phospholipids and neutral lipids in poultry meat; fatty acid composition of poultry fat; effects of diet on the fatty acid composition of poultry lipids; and the protein, fat and energy contents of various poultry products.

AJDW

## 91

Food products formulary. Vol. 1. Meats, poultry, fish, shellfish. [Book]

Long, L.; Komarik, S. L.; Tressler, D. K.  
Ed. 2, xiii + 459pp. ISBN 0-87055-392-5 (1982) [En]  
Westport, Connecticut, USA; AVI Publishing Co. Inc.  
Price \$55.00 (US) \$60.50 (foreign)

This book includes the following sections: Cured meats (pp. 1-30); Sausages (pp. 31-93); Luncheon meats, meat loaves and meat spreads (pp. 94-129); Meat, poultry and seafood products using plant proteins (pp. 130-183); Miscellaneous canned meat products (pp. 184-212). Frozen meat, meat dishes, sauces and gravies (pp. 213-235). Soups, gravies and sauces (including mixes) (pp. 236-261); Poultry products (pp. 262-293); Fish products (pp. 294-328); Shellfish and miscellaneous marine products (pp. 329-353); Buffet and catering entrees featuring beef, veal, lamb, pork, poultry, seafood (pp. 354-393); Government purchasing of meats, poultry, seafood (pp. 394-404); and Federal and military specifications (pp. 404-452). A 7-pp. subject index is included. AJDW

## 92

Technological feasibility of preserving meat, poultry and fish products by using a combination of conventional additives, mild heat treatment and irradiation. (In 'Combination processes in food irradiation' [see FSTA (1982) 14 8C331]) [Lecture]  
Wiericki, E.

pp. 181-203 (1981) [40 ref. En] [United States Army Natick Res. & Development Lab., Natick, Maryland, USA]

Irradiation of foods by sterilizing doses of ionizing radiation (radappertization) is discussed in the following sections: radappertization process, i.e. processing steps for radappertization (product preparation, enzyme inactivation, vacuum-packaging, irradiation in the frozen state), microbiological safety (adjustment to the 12D dose with changing the irradiation temp., estimated irradiation sterilizing dose, production microbiological safety tests), reduction and elimination of nitrite (e.g. in pre-fried bacon); the need for radappertized foods; and conclusions and recommendations. It is concluded that radappertization is a feasible process, and with regard to meats, poultry and seafood is a combination of mild heat treatment, selective use of food additives, vacuum-packaging and irradiation. LH

## 93

Meat, poultry and seafood technology. Recent developments. [Book]

Karmas, E.  
*Food Technology Review, Noyes Data Corporation*  
No. 56, xv + 427pp. ISBN 0-8155-0887-5 (1982) [En]  
Mill Road, Park Ridge, New Jersey 07656, USA; Noyes Data Corp. Price \$45.00 [Dep. of Food Sci., Rutgers Univ., New Jersey, USA]

The information in this book is based on US patents issued since April 1974, that deal with meat, poultry and seafood. It contains new developments since the previous titles were published [see FSTA (1976) 8 1R25, 9S1572, and 12S2084]. The book is divided into 3 parts: Fresh meat and meat product technology (pp. 4-241); Poultry technology (pp. 244-286); and Fish-shellfish technology (pp. 287-417). The information is arranged under the following headings: Immediate post-mortem operations (pp. 4-18). Meat-bone separation and rendering operations (pp. 19-27). Integral meats (pp. 28-44). Tenderness and tenderness evaluation (pp. 45-60). Flavours and flavourings (pp. 61-91). Colours and colorants (pp. 92-103). Cooking and processing procedures (pp. 104-118). Curing operations (pp. 119-137). Chemical agents preventing nitrosamine formation (pp. 138-142). Diverse meat products and processes (pp. 143-167). Sausage products and processing (pp. 168-187). Bacon analogs and processing (pp. 188-203). Meat analogs and extenders of plant origin (pp. 204-212). Preservation methods (pp. 213-230). Packaging methods (pp. 231-241). Post-mortem carcass handling and processing (pp. 244-268). Processing of raw poultry parts (pp. 269-270). Injection and marinating methods (pp. 271-275). Processes in connection with serving poultry (pp. 276-286). Processes related to color and flavor of fish (pp. 288-299). Filleting fish and related methods (pp. 300-310). Freeze-processing of fish (pp. 311-321). Miscellaneous processing of fish (pp. 322-332). Fish protein hydrolysates (including mercury removal) (pp. 333-338). Soluble fish protein products (pp. 339-345). Kamaboko-related products (pp. 346-364). Roe products (pp. 365-

369). Miscellaneous fish products (pp. 370-374). Recovery of shellfish meat and proteins (pp. 375-391). Shell extracts (pp. 392-398). Shellfish preservation and storage methods (pp. 399-405). Miscellaneous shellfish products (pp. 406-417). Company, inventor and US patent number indexes are included. VJG

94

#### Apparatus for weighing fowl.

Meyn, P.

**United States Patent** 4 300 644 (1981) [En]

Apparatus is described for weighing poultry hanging from a shackle of known wt. carried by a continuously moving overhead conveyor. The apparatus can be used to weigh birds during processing, to establish yield losses and/or water pick-up. RAW

95

#### Prevention of *Salmonella* infection in chicks by treatment with fecal cultures from mature chickens (Nurmi cultures).

Pivnick, H.; Blanchfield, B.; D'Aoust, J.-Y.

**Journal of Food Protection** 44 (12) 909-916 (1981)

[32 ref. En] [Health Protection Branch, Dep. of Nat. Health & Welfare, Ottawa, Ontario, Canada K1A 0L2]

1-day old chicks were treated per os with anaerobic cultures of faeces (Nurmi cultures) from *Salmonella*-free mature chickens. Challenge of the chicks with *S. typhimurium* 2 days after treatment showed that they were 1000 x more resistant to infection than untreated chicks. Efficacy of the faecal culture was unaffected by repeated subculturing (up to 4 times studied), dilution in drinking water or frozen storage at -70°C. Consequences for contamination of poultry meat by *Salmonella* are discussed. DIH

96

#### Reduction of *Salmonella* excretion into drinking water following treatment of chicks with Nurmi culture.

Stersky, A.; Blanchfield, B.; Thacker, C.; Pivnick, H.

**Journal of Food Protection** 44 (12) 917-920 (1981)

[16 ref. En] [Health Protection Branch, Dep. of Nat. Health & Welfare, Ottawa, Ontario, Canada K1A 0L2]

1-day old chicks were treated with anaerobic faecal cultures (see preceding abstr.) and challenged 2 days later with *Salmonella typhimurium*. 16% of treated chicks challenged with  $10^4$ - $10^5$  salmonellae/chick became infected; untreated chicks showed infection rates that increased from 58 to 92% with increasing number of challenge organisms from  $10^2$  to  $10^6$ /chick. Treated chicks that did become infected contaminated their drinking water with fewer salmonellae than did infected untreated chicks. Consequences for spread of *Salmonella* infection within a flock and production of *Salmonella*-free birds are discussed. DIH

97

**Collaborative trial to examine the commercial application of parts of Council Regulation (EEC) No. 2967/76 laying down common standards for the water content of frozen and deep frozen chickens, hens and cocks.**

Jonas, D. A.

**Journal of Food Technology** 16 (6) 683-699 (1981)

[7 ref. En] [Food Sci. Div., Min. of Agric., Fisheries & Food, Great Westminster House, Horseferry Road, London SW1P 2AE, UK]

Under commercial conditions the techniques described in Annexes I and III of Regulation 2967/76 are practicable. However, in interpreting the water/protein relationships of commercially produced poultry, consideration should be paid to the fact that water pick-up during spray washing and mechanical immersion chilling is inversely related to carcass wt. Also since offal contains a higher physiological water content than chicken carcasses and the carcasses are always packed with a random set of washed offal their influence on the water/protein relationship of the carcass and offal combined is greater for smaller carcasses than for larger ones. (In accordance with UK practice throughout this paper, offal means neck, gizzard, liver and heart.) AS

98

#### Water content of frozen or deep-frozen poultry - comparison of methods of determination.

Commission of the European Communities

**Information on Agriculture** No. 71, 150pp. ISBN 92-825-1644-X (1980) [En]

Studies were conducted to evaluate the 2 methods (based on protein detn. or DM detn.) for evaluation of the moisture content of frozen poultry, specified in EEC Regulation No. 2967 of 23 Nov. 1976. Trials were conducted on broilers, cocks and hens. Estimation of added water content was more accurate (by either method) for broilers than for cocks and hens. Results determined by the 2 methods differ; the 'protein' method gives a slight overestimate of added water content, whereas the 'DM' method with the use of regressions slightly underestimates added water content. Use of the DM method with a constant coeff. gives poorer results than the DM method with regressions. Modifications to the EEC regulations to improve accuracy and uniformity of evaluation of added water content are suggested. AJDW

99

[Assessing the extraneous water content of frozen poultry using EEC Regulation No. 2967/76 as amended by EEC Regulation No. 2632/80.] Zur Beurteilung des Fremdwassergehaltes in gefrorenem Schlachtgeflügel. Anwendung der VO (EWG) Nr. 2967/76 des Rates in der zuletzt durch die VO (EWG) Nr. 2632/80 geänderten Fassung. Ehinger, F.

**Fleischwirtschaft** 61 (10) 1577-1579 (1981) [3 ref. De, en] [Univ. Hohenheim, D-7000 Stuttgart 70, Federal Republic of Germany]

Data forming the basis of the investigation by Scholtysek et al. (1979) [see FSTA (1979) 11 10S1611] were recalculated in accordance with the current

version of EEC Regulation No. 2967/76. No changes were made to appendices I and II of this Regulation. The extraneous water content could be estimated somewhat better by using the formula for natural water content as given in appendix III. Correlation with appendix I was only slightly improved. The same applied to correlation with appendices II and IV. When using this method much higher extraneous water contents were obtained than with the earlier calculation. The amendment to the calculation formula for natural water content in appendix IV resulted in greatly increased extraneous water contents being determined in oven-ready birds. Correlation to appendices I, II and III was only slightly improved. We should not conclude from the present results that both chemical methods tolerate a uniform extraneous water content. The size of the random sample also needs to be increased considerably if the regulation is to be applied properly. The random sample size, calculated to give a meaningful result is related to an accuracy of 1%; more precise distinctions, e.g. 0.1% were shown to be unrealistic and impracticable because of the great variation in the results when using the two chemical methods. AS

## 100

### Poultry trussing device.

Volk, A. J.; Volk, H. J.

*United States Patent* 4 293 977 (1981) [En]

A poultry leg retainer is described that is formed of a single elongated piece of material and that fits into creases of poultry hocks. The device permits good gripping and secures poultry legs to the carcass while admitting bagging trussed fowl. AS

## 101

### Gizzard inspection and peeling system.

DeLong, H. J.

*United States Patent* 4 306 333 (1981) [En]

Poultry gizzards are washed down an inclined inspection table and visually inspected: those gizzards needing additional peeling are manually removed to a repel hopper, and those gizzards that do not need additional peeling are removed to a discharge hopper. The peeled gizzards are then manually placed in the discharge hopper. AS

## 102

### Poultry head pulling apparatus.

McDonald, D. M.; Scheier, D. J. (Simon-Johnson Inc.)

*United States Patent* 4 293 978 (1981) [En]

Poultry heads are pulled downwards during continuous advancement for automatic separation of the heads from the necks; all of the edible neck skin is salvaged and certain inedible organs are simultaneously removed, without separating the head from the oesophagus or trachea. AS

## 103

### Instron measurements and sensory scores for texture of poultry meat and frankfurters.

Prusa, K. J.; Bowers, J. A.; Chambers, E. IV

*Journal of Food Science* 47 (2) 653-654 (1982) [En]  
[Dep. of Food & Nutr., Kansas State Univ., Manhattan, Kansas 66506, USA]

The relationship of sensory scores and Instron measurements of poultry meat and frankfurters was studied. Chicken samples were separated by tensile grips; turkey samples were sheared with a Warner-Bratzler shear attachment and compressed with a simulated-molar attachment; and poultry frankfurters were tested with the Warner-Bratzler shear, puncture probe, and simulated-teeth attachments. Generally, for chicken higher correlation coeff. between sensory scores and Instron measurements resulted when baseline length and area measurements of curves were made than when peak height was measured. For turkey, Instron measurement with either the Warner-Bratzler shear or the simulated-molar attachment were not related significantly to sensory scores. For frankfurters, Instron measurements usually were significantly correlated with sensory scores for firmness. IFT

## 104

### [Study of proteins in various types of meat.]

Burica, O.; Vitez, L.

*Tehnologija Mesa* 21 (9) 246-248 (1980) [9 ref. Sh, en]  
[Kemijski Inst. 'Boris Kidric', Ljubljana, Yugoslavia]

Electrophoretic studies on proteins of fresh pork, beef and poultry are described. After removal of fat and skin, the meat samples were homogenized with water, the homogenate was extracted at 4°C and centrifuged. The supernatant was then separated by electrophoresis on celogel at 200 V for 2 h using pH 8.65 buffer. The electrophoretogram was stained with 0.5% amido black in methanol/acetic acid/water (475:450:475) and evaluated by densitometry. Results show that electrophoresis of water-soluble proteins can be used to identify the animal species of meat samples. STI

## 105

### [Dependence of the structural-mechanical properties of homogenized preserves on processing parameters.] [Lecture]

Gonotskii, V. A.; Shevchenko, S. N.; Kosoi, V. D.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-9, pp. 145-147 (1980) [6 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptisepererabatyvayushchei i Kleezhelatinovo Promyshlennosti 'Kompleks', Moscow, USSR]

In preliminary trials, poultry meat was minced 1-4 x in a colloidal mill, with a stator/rotor clearance of 0.35, 0.5 or 0.7 mm; some samples were also minced on the described mill (0.35 mm clearance) with subsequent milling on a corundum mill (0.01 mm clearance). Dispersibility of particles (< 200 µm) determined by sieve or microscopic methods, weakly bound moisture content, content of separated broth, and max. shear stress of the sterilized product are tabulated for the homogenization methods. Max. shear stress was

greatest for products with the highest degree of mincing. In further trials, native or modified starches (potato, corn, amylopectin) were added at 2.5 g/100 g preserves (under optimal comminution parameters); preserves without added starch served as controls. Data are tabulated on max. shear stress of test and control preserves and sterilized preserves for starch added in powder or gelatinized form, and on max. shear stress, bound moisture and separated broth after sterilization for additions of 0-3.5% potato starch. It is concluded that optimal mincing is performed on a caged colloidal mill with 0.35 mm clearance, with a stabilized product (addition of 2.5% potato or corn native starch before homogenization being the most effective). [See FSTA (1982) 14 8S1379.] RAW

## 106

Extension of refrigerated shelf life and inhibition of pathogenic bacteria in fresh and vacuum packaged poultry by sorbic acid and potassium sorbate.

[Lecture]

Robach, M. C.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, M-10, pp. 245-247 (1980) [20 ref. En] [Monsanto Co., St. Louis, Missouri, USA]

Use of sorbic acid and sorbates for preservation of poultry is discussed, with reference to literature data. Aspects considered include: use of flaked ice containing sorbic acid; sorbic acid dips; application to fresh and vacuum-packaged poultry and poultry products; residues in treated poultry; effects on organoleptic properties; improvement of refrigerated shelf life; and control of salmonellae, *Pseudomonas* spp., *Staphylococcus aureus*, *Escherichia coli* etc. in poultry products. [See FSTA (1982) 14 8S1379.] AJDW

## 107

Salmonella control in poultry through the use of gamma irradiation. (In 'Combination processes in food irradiation' [see FSTA (1982) 14 8C331]) [Lecture]

Ouwerkerk, T.

pp. 335-345 (1981) [En] [Atomic Energy Canada Ltd. - Commercial Products, Ottawa, Canada]

A case study made in Canada, on commercial application of gamma irradiation to control *Salmonella* contamination in poultry, is presented. It is concluded that elimination of *Salmonella* could best be achieved by treating poultry at the end of the processors' production line, with a 300 krad dose. Economic aspects of the procedure are discussed. LH

## 108

Combined effect of reduced water activity, heat and irradiation on microbial stability of canned goose-liver. (In 'Combination processes in food irradiation' [see FSTA (1982) 14 8C331]) [Lecture]

Farkas, J.; Andrassy, E.

pp. 131-139 (1981) [41 ref. En] [Cent. Food Res. Inst., Budapest, Hungary]

Fresh goose liver and goose fat were kept at 0-2°C for 18 h, then processed together into cans with 0.5 or 1.5 g NaCl. Heat treatment was at an  $F_0$  value of

1.6 min; radiation treatment was at 5 and 10 kGy. These treatments (heat and radiation) were done separately and in combination. Prior to canning, some samples were inoculated with *Clostridium sporogenes* V 1240.2.1.1. (0.1 ml of solution containing  $5 \times 10^6$  spores/ml). Cans were stored at 30°C and the proportion of swollen cans was recorded in a 90-day study; sensory testing was by 6 panelists using colour, odour, taste and texture as parameters, and only samples containing 1.5 g NaCl and subjected to 10 kGy were examined sensorily. Product containing 0.5 g NaCl had an  $a_w$  of 0.97 vs. 0.94 with 1.5 g; all products scored 4-5 in organoleptic tests, critical score for unacceptability being 3.0; swollen cans were always the result of microbial spoilage. Reducing  $a_w$  and combining heat and radiation treatments seemed suitable to preserve goose liver quality. LH

## 109

[Evaluating meat quality of geese from different fattening systems.]

Hrouz, J.

*Zivocisna Vyroba* 26 (8) 621-626 (1981) [6 ref. Cs, ru, en, de] [Vysoka skola zemedelska, Zemedelska 1, 662 65 Brno, Czechoslovakia]

Data were obtained on 10 broilers slaughtered at 4070 g body wt., 10 broilers slaughtered at 4410 g, 12 extensively fed females, 10 females fattened for foie-gras production, 12 females culled from breeding and not finished, and 8 females culled from breeding and finished before slaughter. The birds were mostly White Italian x Rhenish or Rhenish x Landes crossbreds. For the 6 groups resp., the % DM in the breast muscle averaged 22.4, 24.2, 27.6, 28.1, 25.3 and 27.2, the % fat 0.15, 0.31, 0.37, 0.25, 0.30 and 0.24, and the % connective tissue 6.8, 8.4, 5.5 and 4.9 (first 4 groups only). Corresponding % in leg muscles were 26.0, 26.6, 31.1, 28.3, 24.8 and 26.3; 0.35, 0.62, 0.64, 0.67, 0.32 and 0.25; and 7.4, 6.4, 5.2 and 8.3. Data on liver composition and on the significance of group differences are also given. [From *Animal Breeding Abstracts*.]

## 110

Flavor of poultry meat - a review. [Review]

Ramaswamy, H. S.; Richards, J. F.

*Canadian Institute of Food Science and Technology Journal* 15 (1) 7-18 (1982) [128 ref. En, fr] [Dep. of Food Sci., Univ. of British Columbia, Vancouver, British Columbia V6T 2A2, Canada]

More than 250 chemical compounds have been identified in the volatiles of poultry meat and about 85 have been confirmed by 2 or more researchers. In 2 different approaches (sensory and chemical) the effect of feed, age and sex on poultry flavour, characterization of the volatile chemical compounds and their precursors, and the significance of pH in poultry flavour have been the subject matter of a number of investigations. Both S containing and carbonyl compounds are considered important in poultry flavour. S-amino acids and lipid materials are the major precursors of these compounds. This review brings together pertinent information available on poultry flavour research. AS

## 111

[Packaging equipment for meat, poultry and cheese.]  
Verpackungsanlagen für Fleisch, Geflügel und Käse.  
Heitz, E.

*Zeitschrift für Lebensmittel-Technologie und -Verfahrenstechnik* 33 (2) 103-104, 106, 108 (1982)  
[De] [Baitenhauser Strasse 33, 7758 Daisendorf, Federal Republic of Germany]

The design, characteristics and operation of 2 packaging lines manufactured by Du Pont de Nemours International SA: the 'Bivac' and 'Pervac' machines are described. Aspects considered include films used, vacuum and/or shrink-wrapping facilities, capacity, pack size, and applications. A packaging line for processed cheese portions, incorporating a Green Bay Machinery extruder, is also described. Vacuum skin packaging is considered, as is use of Mylar tape for sealing of cartons. AJDW

## 112

[Machine for removal of the head of poultry.]

Maschine zum Abtrennen der Köpfe von Schlachtgeflügel.

Krause, M.

*German Democratic Republic Patent* 149 998 (1981)  
[De]

A device for removal of the heads from poultry on a conveyor is described; the neck is cut between the first and second cervical vertebrae. Differences in neck length can be compensated. IN

## 113

[Method and apparatus for weighing poultry.]

Meyn, P.

*French Patent Application* 2 484 087 (1981) [Fr]

## 114

[Study of blood serum and liver lipids in geese during force-feeding.]

Sevcikova, I.; Sova, Z.; Trefny, D.  
*Zivocisna Vyroba* 26 (5) 363-370 (1981) [22 ref. Cs, ru, en, de] [Vysoka Skola Zemedelska, Katedra Biol. Zakladu Zivocisne Vyroby, 160 21 Prague-Suchdol, Czechoslovakia]

Groups of 23-26 4-wk-old Rhine geese were fed ad lib. (i) until 4 months of age in 1 experiment and (ii) until 5 months of age in a 2nd experiment. (i) were then force-fed with steamed maize 3 x daily for 30 days; and (ii) were similarly force-fed 2 x daily for 25 days. Half of (i) group and half of (ii) group were kept in pens (P), the others being kept in individual cages (C). Procedures are described in detail. Against backgrounds of mean liver wt of 196 and 254 g for (i) P and (i) C, and of 291 and 345 g for (ii) P and (ii) C resp., DM contents of livers of the 4 groups were resp.  $34.8 \pm 3.3$ ,  $39.1 \pm 5.0$ ,  $41.3 \pm 5.5$ , and  $45.9 \pm 4.9\%$ ; and fat contents in liver DM were correspondingly  $54.2 \pm 14.6$ ,  $51.9 \pm 16.7$ ,  $61.3 \pm 20.8$ , and  $71.2 \pm 18.0$  g/100 g. SKK

## 115

Influence of water deprivation on water consumption, growth, and carcass characteristics of ducks.

Veltmann, J. R., Jr.; Sharlin, J. S.

*Poultry Science* 60 (3) 637-642 (1981) [11 ref. En] [Dep. of Poultry Sci., Cornell Univ., Duck Res. Lab., Eastport, Long Island, New York 11941, USA]

Groups of White Pekin ducks (2 wk of age at the start of the experiment) were used in a study on effects of restriction of access to water on performance and carcass quality. Access to water was allowed for 4, 6, 8, 16 or 24 h/day. The ducks were slaughtered at 42 days of age and carcass composition evaluated. Data are given for fat, total meat and breast meat contents of the carcass. The % breast meat was significantly higher for water access for 6 or 24 h/day than for 16 h. No significant effect of water access time on fat or total meat % in the carcass was observed. AJDW

## 116

Reducing dust in the live-hang area of a poultry processing plant.

Dickens, J. A.; Vaughn, R. E.

*Poultry Science* 60 (5) 1097-1098 (1981) [1 ref. En] [Process Eng. Res. Unit, Richard B. Russell Agric. Res. Cent., USDA, Sci. & Education Administration, Agric. Res. PO Box 5677, Athens, Georgia 30613, USA]

A semi-enclosed environmental chamber for the live hang area of a poultry processing plant was designed, constructed, and tested for the purpose of creating better working conditions for the personnel in this area. The chamber reduced the dust in the immediate area of the hangers and allowed the area to be cooled or heated as needed. With the working environment improved, health hazards associated with dust inhalation and personnel turnover, a major problem, should decrease and efficiency of workers should increase. AS

## 117

Mineral content of commercial samples of mechanically deboned poultry meat.

Jamm, D.; Searcy, G. K.

*Poultry Science* 60 (3) 686-688 (1981) [6 ref. En] [Anim. Products Composition & Utilization Res. Unit, USDA, c. Richard B. Russell Agric. Res. Cent., Athens, Georgia 30613, USA]

9 commercial samples of mechanically-deboned poultry meat (3 from broiler necks, 3 from broiler breasts, 2 from fowl frames, 1 from turkey frames) were analysed. A table of data is given for concn. of moisture, fat, protein, ash, P, K, Ca, Na, Mg, Fe, Zn, Cu, Mn and Pb. These results are considered in relation to literature data. Ca contents varied widely in the products studied, probably as a result of differences in bone content; P contents agreed well with Ca contents. Fe concn. varied relatively little, in contrast to the high variability of literature data. Concn. of elements present at low levels (Cu, Mn and Pb) varied considerably, possibly as a result of contamination during processing. AJDW

## 118

[Amino acid contents of game meat.]

Popa, G.; Mihai, M.; Curca, D.; Buruiana, L. M.; Cernaiaru, E.

*Lucrari Stiintifice, Institutul Agronomic N. Balcescu, C 20/21, 165-170 (1977/1978)* [9 ref. Ro, en]

The amino acid content of protein hydrolysates of 7 types of game meat were determined by chromatographic analysis. Animal spp. studied were pheasant, wild goose, wild duck, wild goat, wild boar, hare and bear. Results, tabulated in detail, are discussed from the viewpoints of the different amino concn. in different parts of the same sp., and inter-specific differences. HBr

## 119

[Hygienic significance of using fodder antibiotics in animal husbandry.]

Pripitina, L. S.; Ol'shanskaya, O. D.; Vorob'eva, T. V.; Zhil'skaya, Zh. Ya.

*Voprosy Pitaniya* No. 1, 50-53 (1982) [9 ref. Ru, en]  
[Kievskii NII Gigienny Pitaniya Minzdrava UkrSSR, Kiev, USSR]

Poultry were fed diets including  $\leq 1000$  mg/kg live wt. fradizin-5 and fradizin-10, and 100 mg/kg live wt. kormogrizin-10 either until slaughter, or with intake of the antibiotics ceasing at 15 or 30 days before slaughter. Analysis of the poultry meat and internal organs showed that antibiotics (tylosin and grisin: active ingredients of the fodder antibiotics) did not accumulate in the muscle, stomach, liver and kidneys; organoleptic analysis showed the meat from test (receiving diets containing antibiotics) and control poultry (not fed antibiotics) to be similar. Laboratory animals fed the test poultry meat were similar to those fed control poultry meat in body activity and composition, indicating that the test poultry meat is suitable for human consumption. Peroral administration of 0.04-4.0 mg/kg body wt. fradizin and 0.004-4.0 mg/kg body wt. kormogrizin in laboratory toxicity trials showed that the threshold level in long-term administration for both fradizin and kormogrizin was 0.4 mg/kg. The administration of fradizin ( $\leq 1000$  mg/kg live wt.) and kormogrizin ( $\leq 100$  mg/kg live wt.) is considered acceptable providing that administration of antibiotics is stopped at least 7 days before slaughter. RAW

## 120

Apparatus for removing the vertical vertebrae from the neck of slaughtered fowls.

Mil, M. P. G. van (Stork PMT BV)

*United States Patent* 4 308 639 (1982) [En]

## 121

[Mercury content of animal tissues (fish, butcher's meat and venison).]

Vidane Poroszlai, B.; Simonffy, Z.

*Magyar Allatorvosok Lapja* 36 (1) 57-60 (1981) [11 ref. Hu, en, de, ru] [MEM, Elelmiszeripari Higieniai Ellenörzö Szolgálat, Budapest, Hungary]

Hg contents in fish and meat samples were determined by flameless AAS, and results are tabulated. Mean Hg content in muscle samples from 100 breams (*Abramis brama*) from Lake Balaton was 0.051 mg/kg, range 0.011-0.181. Max. permitted content (MPC) in Hungary is 0.500 mg/kg. Mean contents in bream liver, roe and milt were 0.052, 0.015 and 0.026 mg/kg. Hg contents are tabulated for muscle (M), liver (L) and kidney of pigs and cattle, for M and L of chicken, pheasant and wild duck, and for M only of duck, roe and red deer and wild boar. These represented only 1-6 samples, except for pigs. Hg contents of pig tissues were as follows: M mean 0.002 mg/kg (1 sample out of 56 > 0.03 mg/kg, MPC); L mean 0.029 mg/kg (7 of 54 samples > 0.05, MPC); kidney, mean 0.033 (11 of 36 samples > 0.05, MPC). None of the other animal tissues studied exceeded the MPC except for 1 of 2 samples of wild duck liver. DIH

## 122

Cleaning poultry fat from stainless steel flat plates.

Shupe, W. L.; Bailey, J. S.; Whitehead, W. K.; Thomson, J. E.

*ASAE Paper* No. 81-6023, 19pp. (1981) [7 ref. En]  
[USDA-SEA-AR, PO Box 5677, Athens, Georgia 30613, USA]

A fixture used to test cleaning of flat stainless steel plates with spray nozzles was constructed. Bacterial counts on stainless steel plates were not significantly different when washing was at 690, 2068 or 4137 kPa. Washing with 50° or 70°C water removed significantly more bacteria than washing with 20°C water, with or without detergent. Fat removal was not significantly different at various water pressures or temp. when detergent was used. When no detergent was applied, fat removal was significantly lower with 690 kPa than either 2068 or 4137 kPa and lower with 20°C water than either 50° or 70°C. AS

## 123

Soy protein enhances value of meat, fish and poultry products.

Anon.

*Food Product Development* 15 (1) 38, 51 (1981) [En]

The possibility of improved nutrition and higher yields by using soy protein ingredients in meat, fish and poultry products is considered. Some of the major producers of soy products and suggested uses for their products, are presented. VJG

124

**A note on the effects of heat stress on carcass composition and adipose tissue cellularity of ducklings.**

Farrell, D. J.; Atmamihardja, S. I.; Hood, R. L.  
*British Poultry Science* 22 (6) 533-536 (1981) [5 ref.  
 En] [Dep. of Biochem. & Nutr., Univ. of New England,  
 Armidale, NSW 2351, Australia]

The effects of heat exposure (36°C) from 14 or 18 days of age on ducklings were assessed by comparison with pair-fed or *ad lib.* fed controls at 22°C. From 28 days all groups were fed *ad lib.* at normal temp. until samples were killed at 41 or 54 days. Proportional fat pad size, adipose cell vol. and number were less for all experimental groups than for *ad lib.* fed controls at 41 days, but these differences largely disappeared by 54 days. Carcass fat varied little between groups. Carcass moisture was less in heat-exposed than in pair-fed birds at 54 days, and carcass protein was greater at 41 days. AS

125

[Automatic neck cutter for poultry.] Automatischer Nackenschneider für Geflügel.  
 Zöphel, K.-H.

*Fleisch* 36 (1) 8-9 (1982) [De] [VEB KIM, Königs-Wusterhausen, German Democratic Republic]

An automatic neck cutter for poultry, applied sequentially to the defeathering unit, is described, with details of its construction and mode of operation. Throughput is 4000-5000 broilers/h. IN

126

[Organization and implementation of slaughter poultry and poultry meat inspection in the Vechta district.] Organisation und Durchführung der Schlachtgeflügel- und Geflügelfleischuntersuchung im Kreis Vechta.  
 Dunger, F.

*Archiv für Lebensmittelhygiene* 32 (5) 161-163 (1981) [De, en]

Deployment of the available trained poultry meat inspectors in 4 slaughtering and packing plants is described. RM

127

[Waste water problems in a poultry slaughterhouse.] Abwasserfragen in einer Geflügelschlachterei.  
 Wille, W.

*Archiv für Lebensmittelhygiene* 32 (6) 214-215 (1981) [De, en] [Wasseruntersuchungsamt, 3200 Hildesheim, Federal Republic of Germany]

The purification of poultry slaughterhouse waste water is discussed in the context of German environmental protection legislation. RM

128

**Vitamin E and keeping quality of poultry and pork products. [Review]**

Marusich, W. L.  
*Roche Information Service* 26pp. (1982) [138 ref. En] [Anim. Nutr. Dep., Hoffmann-La Roche Inc., Nutley, New Jersey, USA]

Literature data on the use of vitamin E as an antioxidant in poultry and in pork products are reviewed. Aspects considered include: forms of vitamin E; oxidative deterioration of lipids in poultry meat, and its effect on flavour; effects of dietary tocopherols on the rate of lipid oxidation; tocopherol levels in poultry tissues; results for broilers and for turkeys; effects of vitamin E on fat oxidation in and quality of various poultry products; fat oxidation in and quality of various poultry products; fat oxidation in pork, and effects of vitamin E; and levels of vitamin E in porcine tissues. AJDW

129

[Slaughter and evisceration of poultry.]

Italy, Ministero di Grazia e Giustizia

*Industrie Alimentari* 20 (11) 801-802 (1981) [It]

130

**Examination of poultry giblets, raw milk and meat for *Campylobacter fetus* subsp. *jejuni*.**

Christopher, F. M.; Smith, G. C.; Vanderzant, C.  
*Journal of Food Protection* 45 (3) 260-262 (1982)  
 [15 ref. En] [Dep. of Anim. Sci., Texas Agric. Exp. Sta., Texas A&M Univ., College Station, Texas 77843, USA]

An MPN procedure was used to determine the presence of *Campylobacter fetus* subsp. *jejuni* in poultry giblets. This procedure consists of subculturing a sample in Brucella broth supplemented with 0.15% agar, 0.05% sodium pyruvate and the following antimicrobial agents/l: vancomycin 10 mg, trimethoprim 5 mg, polymyxin B sulphate 2500 IU, amphotericin B 2 mg and cephalothin 15 mg. A loopful of broth was streaked onto plates of Brucella agar supplemented with 10% defibrinated horse blood and the same antimicrobial agents as above. *C. fetus* subsp. *jejuni* was present in 85% of the chicken livers and in 89% of the chicken gizzards obtained immediately after evisceration. The organism was not recovered from samples treated with chlorinated water or from raw milk (bulk tank samples or individual cow samples) or from beef (*infraspinatus* or *biceps femoris* muscles). AS

131

**[Antibiotic residues in animal products with special reference to cows' milk, poultry meat and eggs.]**

[Review]

Cho, T. H.

*Korean Journal of Veterinary Public Health* 2 (1) 56-71 (1978) [30 ref. Ko] [Inst. of Vet. Res., Office of Rural Development, Suwon, S. Korea]

This review, drawing heavily on Japanese studies, discusses the types of antibiotics residues found in animal products, the toxicological implications of

residues, allergies to antibiotics, and effects on processing (especially of dairy products) and the extent of contamination of milk, meat and eggs. Results of studies on antibiotics residues in animal products are tabulated. BWH

## 132

### Effects of boiling and boiling/roasting on subsequent utilization of soybeans by chickens.

Ogundipe, S. O.

*Dissertation Abstracts International, B 41 (7) 2404-2405: Order no. 8101145, 178 pp. (1981) [En] [Michigan State Univ., E. Lansing, Michigan 48824, USA]*

The extent to which meals made from boiled soybeans or boiled/roasted soybeans could be used in broiler and layer rations without adverse effects, was evaluated. Sensory evaluations of baked meat samples taken from birds fed: (i) the SBM-control diet (48% protein, soybean meal), (ii) 30% boilsoy diet (boiled soybean meal) and (iii) 30% roastsoy diet

(boiled/roasted soybean meal) were obtained for colour, odour, flavour, juiciness, tenderness and overall acceptability. Meat from (iii), received the highest overall ranking score for eating quality ( $P < 0.05$ ) and the highest score for all meat quality characteristics considered. Trials were conducted with laying hens, fed 7.5, 15 and 22.5% of boilsoy and roastsoy for five 28 day periods. It was concluded that up to 25% roastsoy could be incorporated in layer diets without adverse effects on egg wt. and egg production. SP

## 133

### Quality of poultry meat. Proceedings of the Fifth European symposium held at Hotel Bloemink, Apeldoorn, 17-23 May 1981. [Conference proceedings]

Mulder, R. W. A. W.; Scheele, C. W.; Veerkamp, C. H. (World Poultry Science Association, European Federation; Netherlands, Spelderholt Institute for Poultry Research) (Editors) viii + 488pp. ISBN 90-9000197-2 (1981) [many ref. En] Beekbergen, Netherlands; Spelderholt Institute for Poultry Research

The text is given of papers presented at this symposium, including the following. Process control for the poultry industry and for yields of the operations, by C. H. Veerkamp, M. G. Mast & J. A. M. Tansien (pp. 5-13, 11 ref.). The processing of offals and feathers from poultry slaughterhouses, by H. Kamb (pp. 66-69). Purification of waste water from poultry processing plants by flocculation-flotation and the use of recovered material as a feedstuff, by P. ten Have (pp. 70-79, 3 ref.). Waste water treatment for meat and poultry processing plants, by R. van Staa (pp. 88-94, 3 ref.). Energy conservation in poultry processing plants - a practical approach, by J. E. Marion (pp. 105-110, 15 ref.). Theoretical considerations on energy conservation, by B. Erdtsieck (pp. 111-117, 7 ref.). Uses and conservation of water in poultry processing, by M. G. Mast & C. H. Veerkamp (pp. 118-128, 31 ref.). Production and processing of poultry meat in Malaysia, by E. Leong (pp. 131-140, 6 ref.). Poultry meat production and

poultry meat processing in Argentina, now and in future, by M. F. A. Bonino (pp. 141-147). Poultry meat industry in the USSR, by V. I. Fisinin & L. V. Kolesnikov (pp. 148-153, 14 ref.). Summary of technical developments in poultry processing plants, by A. R. Gerrits (pp. 179-281). From house to shackle, by A. R. Gerrits & K. de Koning (pp. 282-288, 7 ref.). Electronic grading and sizing, a source of statistical information, by W. G. Hamelink (pp. 299-300). Degenerative myopathy in meat-type poultry: its effect on production traits in chickens and its identification in live turkeys, by K. G. Hollands, A. A. Grunder, C. J. Williams, J. S. Gavora, J. R. Chambers & N. A. G. Cave (pp. 337-344, 4 ref.). Improvement and prognosis of poultry meat quality, by G. P. Lotsyus (pp. 372-375, 9 ref.). Influence of some prophylactic means on the frequency and extent of contamination of chicken carcasses by *Salmonella*, by C. Lahellec, P. Colin, J. Paquin, A. Guillerm & J. C. Debois (pp. 415-418). A further 43 papers are abstracted separately in FSTA, and are listed in the author index under World Poultry Science Association, European Federation [Poultry Meat Symposium]. AJDW

## 134

### Side suspension conveyor system for poultry.

Altenpohl, W. F.; Altenpohl, P. J. (W. F. Altenpohl Inc.) *United States Patent 4 317 258 (1982) [En]*

Poultry carriers connected to a common overhead conveyor travel along a pair of load supporting tracks through a weighing station. The tracks are laterally spaced from each other below the conveyor to reduce spacing between adjacent carriers in the direction of conveyor travel. Each carrier is supported on a track by a roller assembly having a single roller shaft from which the carrier is pivoted by a side suspension arm, rigidly connected to one axial end of the roller shaft. AS

## 135

### [Rational use of poultry meat after mechanical deboning.]

Gonotskii, V. A.; Krasulya, O. N.; Popov, N. A.; Popkov, V. N.; Bol'shakov, A. S.

*Myasnaya Industriya SSSR No. 7, 16-17 (1981) [7 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsepererabatyvayushchei i Kleezhelatinovoi Promyshlennosti "Kompleks", USSR]*

Studies were conducted on mechanical deboning of poultry meat using a Beehive separator; trials were conducted on chilled substandard poultry and poultry parts, processed using a 0.79 mm mesh and 450 MPa pressure. Mineral content of mechanically-deboned meat is higher than that of manually-deboned meat; Ca content is, however, below the legal limit. Water binding capacity of mechanically-deboned meat is better than that of manually-deboned meat. Sausages made with 30-50% mechanically-deboned meat had sensory properties which did not differ significantly from those of control samples. STI

## 136

Stabilization of poultry tissue through dietary vitamin E. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Friescke, H.

pp. 376-385 (1981) [12 ref. En] [Schalchen, CH-8492 Wila, Switzerland]

Aspects considered include: flavour defects attributable to lipid oxidation; assessment of flavour defects; antioxidant activity of vitamin E; effects of dietary vitamin E on levels in tissues; efficacy of stabilization of lipids in broiler tissue and turkey tissue; feed composition and oxidative stability of poultry tissue; and practical considerations. AJDW

## 137

Food irradiation, a practical method of preservation. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Franken, E.

pp. 480-488 (1981) [4 ref. En] [Gammaster, Ede, Netherlands]

Aspects considered include: problems with salmonellae in poultry; application of irradiation to elimination of salmonellae and other bacteria in poultry; legislation; industrial irradiation in the Netherlands; economics; and practical aspects. AJDW

## 138

Factors decreasing shelf life in production of fresh broilers. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Svendsen, F. U.; Caspersen, C.

pp. 459-465 (1981) [3 ref. En] [Danish Res. Inst. for Poultry Processing, Hillerod, Denmark]

Studies were conducted at a poultry processing plant (capacity 3000 chilled broilers/h) to evaluate bacterial contamination at various stages of processing. Carcasses were evaluated at 7 stages of processing; storage trials were also conducted. Tables and graphs of results are given. Total count was  $10^6$ /g after plucking and changed little during processing; it was  $4.4 \times 10^5$  for the final product. *Pseudomonas* count was  $2 \times 10^3$ /g after plucking; it increased after vent cutting, decreased during spray washing and increased during chilling and packaging. The storage trials showed that odour, total count and *Pseudomonas* count were unacceptable after 8 days at 5°C. Thorough cleaning and disinfection of the slaughter line reduced bacterial contamination by a factor of 10; design of equipment is, however, an obstacle to improved hygiene. AJDW

## 139

Biodeterioration of air chilled poultry carcasses at chill temperatures. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Patterson, J. T.; McMeekin, T. A.

pp. 454-458 (1981) [4 ref. En] [Dep. of Agric. for N. Ireland, Queen's Univ., Belfast, UK]

The spoilage of soft scalded, air chilled carcasses stored under conditions which simulate commercial packaging regimes was examined. Carcasses were

individually wrapped in polyethylene film, or placed unwrapped in fibre-board boxes with or without dry ice. Microbial numbers on breast skin and neck tissue were monitored during storage at 4-5°C until spoilage odours were detected. The shelf life of unwrapped carcasses was limited by the spoilage of neck tissue which carried a greater initial microbial load than breast skin and supported more rapid development of a Gram-negative, oxidase-positive microflora. Growth of these organisms was more restricted on breast skin of unwrapped carcasses. Growth rates on breast skin of wrapped carcasses was faster than that observed on unwrapped carcasses and in one experiment approached the rate on neck tissue. Attempts to decontaminate neck tissue using high levels of chlorine were unsuccessful. AS

## 140

Occurrence of *Yersinia enterocolitica* in poultry products. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Boer, E. de; Hartog, B. J.

pp. 440-446 (1981) [31 ref. En] [Food Inspection Service, Zutphen, Netherlands]

Phosphate buffered saline with and without addition of 1% sorbitol and 0.15% bile salts, modified Rappaport medium and Selenite broth were used as enrichment media for the isolation of *Yersinia enterocolitica* from poultry products. 73 of 108 (68%) samples of poultry products contained *Y. enterocolitica*. *Y. enterocolitica* was isolated most frequently using phosphate buffered saline with sorbitol and bile salts. Nearly all *Y. enterocolitica* strains were isolated on MacConkey agar after KOH-treatment of the enrichment media just before plating. Serotyping showed that the isolated strains belonged to the category of the non-pathogenic, so-called "environmental" strains. AS

## 141

Epidemiology of campylobacteriosis and occurrence of *Campylobacter fetus* subsp. *jejuni* in poultry products. (In 'Quality of poultry meat' [see FSTA (1982) 11S2052]) [Lecture]

Hartog, B. J.; Severin, W. P. J.; Boer, E. de

pp. 425-433 (1981) [43 ref. En] [Food Inspection Service, Enschede, Netherlands]

A retrospective survey of 102 people who had suffered from *Campylobacter* enteritis suggested that inadequate cooking of poultry was a significant factor. Studies on poultry products from retail outlets showed chilled chicken liver to be the most commonly and heavily contaminated with *C. fetus* subsp. *jejuni*; frozen livers had low levels of contamination. Chilled poultry cuts were contaminated less frequently and to a lower degree than chilled livers. *C. fetus* subsp. *jejuni* was also isolated from the peritoneal cavity of chilled and frozen chicken carcasses. 73% of peritoneal swabs from carcasses in a slaughterhouse were contaminated; cooling water was also contaminated, as was air near the scalding tank and evisceration area. AJDW

## 142

**The production area as source of microbial infection and contamination of poultry meat.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture] Matthes, S.

pp. 419-424 (1981) [3 ref. En] [Div. of Hygiene & Diseases, Inst. for Poultry & Small Anim., Fed. Res. Cent. of Agric., Celle, Federal Republic of Germany]

Studies were conducted to evaluate the significance of various aspects of the production environment as sources of contamination of poultry and poultry meat with salmonellae. The results show that feed in silos and the day-old chicks from breeding farms were free from salmonellae. New straw was *Salmonella*-free; however, litter samples collected after 5 wk were mainly contaminated. Grain beetles and mice were commonly contaminated with salmonellae, and are thought to be the main factor transmitting salmonellae to poultry; the same *Salmonella* serotypes were present in mice, beetles, litter and reared chicks, and in some cases in food from troughs. A significant proportion of carcasses were contaminated. Broilers reared in a *Salmonella*-free environment were free from salmonellae at slaughter.

AJDW

## 143

**Enterotoxicity of *Staphylococcus aureus* strains isolated from poultry: raw poultry carcasses as a potential food-poisoning hazard.**

Harvey, J.; Patterson, J. T.; Gibbs, P. A.

*Journal of Applied Bacteriology* 52 (2) 251-258 (1982) [34 ref. En] [Dep. of Agric. for N. Ireland, Newforge Lane, Belfast BT9 5PX, UK]

*Staphylococcus aureus* strains were isolated from end-of-lay poultry carcasses obtained from a plant at 2 different stages of processing before and after storage at different temp. These strains were supplemented with *S. aureus* strains isolated from poultry from a wide range of sources and biotyped, phage typed, and tested for production of enterotoxins A-E. The isolates were found to consist of poultry and human specific strains and each of these groups contained strains able to produce enterotoxin. Poultry strains produced only enterotoxin D whereas human strains produced enterotoxins A, C and D. The hen carcasses used in storage experiments were found to be naturally contaminated with enterotoxin D producing staphylococci. No enterotoxin D could be detected on any of the carcasses even after storage at temp. which allowed multiplication of the organisms to occur (final *S. aureus* counts ranged from  $10^2$  to  $10^7/16 \text{ cm}^2$  of breast skin). AS

## 144

**The enumeration of salmonellae in the poultry industry.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Morgan-Jones, S. C.

pp. 411-414 (1981) [7 ref. En] [Dep. of Microbiol., Edinburgh School of Agric., West Mains Road, Edinburgh EH9 3JG, UK]

Studies on a MPN method for enumeration of

salmonellae in materials in the poultry industry are described. Lysine/iron/cystine/neutral red (LICNR) broth is used; this changes from a red solution to a yellow solution with a black precipitate in the presence of salmonellae. Decimal dilutions of the sample are added to LICNR broth and incubated at 37°C for 36-48 h; samples showing the colour change are then examined by confirmation procedures. Agreement of results with the Poisson distribution is adequate. Addition of novobiocin, bile salts, sodium desoxycholate, sodium biselenite or tetrathionite did not improve performance of the medium. Results with LICNR broth were comparable with those for other media. Proportion of false positives ranged from 0.1% in stored poultry litter to 60% in liquid egg. A saving in time and materials is possible as compared with conventional media. AJDW

## 145

**Methodology for the evaluation of selected functional properties of mechanically deboned poultry.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Mast, M. G.; Gerrits, A. R.; Uijttenboogaart, T. G. pp. 324-334 (1981) [26 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

In evaluating the suitability of mechanically deboned poultry (MDP) or mechanically separated meat for use in food products, the functional properties of this meat must be taken into consideration. A number of mechanical deboners are presently in use by the poultry industry; the basic principle of meat separation varies among these machines, which in turn could affect the functional properties of the MDP produced. This paper presents methods which have been adapted or developed to evaluate the following functional properties of MDP, particularly MDP from various deboning machines: emulsifying capacity, water holding capacity, emulsion stability, cooking losses, and texture measurement for frankfurters and meat patties. AS

## 146

**Electronic weighing, from grading to process control** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Markert, G. H.

pp. 301-305 (1981) [En] [Machinefabriek Markert BV, Ede, Holland]

Use of electronic weighing systems in poultry processing is described, with reference to a poultry slaughterhouse with a capacity of 16 000 birds/h. Applications of electronic weighing systems in the live poultry reception, slaughter, evisceration, chilling and packaging departments are considered. Use of electronic weighing systems in process control is also discussed. AJDW

## 147

**The latest and future developments in poultry processing equipment.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Schipper, J.

pp. 289-298 (1981) [3 ref. En] [Stork PMT BV, Wim de Körverstraat 43a, PO Box 118, 5830 AC, Boxmeer, Holland]

Developments in poultry processing equipment are discussed with reference to: catching and handling of live broilers; the killing line; defeathering; evisceration; handling of edible offal; chilling; electronic grading; packaging; feather and inedible offal disposal; and portioning and further processing. AJDW

## 148

**Tenderness/texture measurement in poultry and poultry products and their relationship to consumer acceptability.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

MacNeil, J. H.; Mast, M. G.

pp. 240-247 (1981) [36 ref. En] [Pennsylvania State Univ., University Park, Pennsylvania 16802, USA]

Measurement of the tenderness and texture of poultry meat is surveyed with reference to: factors influencing meat texture; inter-laboratory variation in sample preparation; the relation between instrumental texture measurements and subjective texture evaluation for poultry muscle; and instrumental evaluation of texture of processed poultry products. AJDW

## 149

**Bacteriological control of cleaning and disinfection of poultry processing plants.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Terbijhe, R. J.; Notermans, S. W. H.

pp. 220-227 (1981) [3 ref. En] [Vet. Service, Koningin Julianaplein 3, The Hague, Netherlands]

Results of application of the agar print method to checking cleaning and disinfection in poultry processing plants are presented; tables and block diagrams of results for poultry processing plants in the Netherlands are described. The results show that recommendations on cleaning and disinfection methods considerably improved hygienic quality; the hygienic quality of poultry processing plants has improved over the period during which the method has been applied to official assessment of approved poultry processing plants.

AJDW

## 150

**The bacteriological monitoring of poultry processing - a critical appraisal.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Morgan-Jones, S. C.

pp. 205-212 (1981) [many ref. En] [Dep. of Microbiol., East of Scotland Coll. of Agric., West Mains Road, Edinburgh EH9 3JG, UK]

Aspects considered include: aims of microbiological monitoring programmes (with reference to detection of pathogens and spoilage organisms); use of the bacteriological results (with special reference to passing

this information on to production workers); methods of bacteriological monitoring (with reference to rapid screening methods, routine methods and reference methods); the relative merits of testing of equipment surfaces vs. the product itself; and planning of a monitoring programme. AJDW

## 151

**Microbiological monitoring of table ready poultry.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Mossel, D. A. A.; Netten, P. van

pp. 190-200 (1981) [many ref. En] [Dep. of Sci. of Food of Anim. Origin, Fac. of Vet. Med., Biltstraat 172, 3572 BP Utrecht, Netherlands]

Microbiological monitoring of poultry is reviewed, with reference to: basic principles of microbiological monitoring; the ecological background of criteria to be applied to poultry; methods for monitoring of chilled and frozen table-ready poultry (covering psychrotrophic Gram-negative rods, Enterobacteriaceae, salmonellae, *Escherichia coli*, *Campylobacter* spp. and Gram-positive spoilage bacteria); additional tests sometimes required (covering *Staphylococcus aureus*, Lancefield group D streptococci, moulds and yeasts); and reference values. AJDW

## 152

**Objective methods for texture evaluation of poultry meat.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Hoof, J. van

pp. 165-180 (1981) [many ref. En] [Dep. of Hygiene & Tech. of Food from Anim. Origin, State Univ., Ghent, Belgium]

Aspects covered in this review include: general aspects of meat texture; structural and chemical indicators of meat tenderness (sarcomere shortening, the myofibril fragmentation index, collagen content), selection of muscle specimens for instrumental testing; preparation of the muscle specimen; the Warner-Bratzler shear device; and other instruments which may be used for meat texture evaluation. AJDW

## 153

**The assessment of the eating quality of chicken meat.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Jones, J. M.; Griffiths, N. M.

pp. 248-253 (1981) [6 ref. En] [ARC Food Res. Inst., Norwich, Norfolk, UK]

Use of laboratory panels, 'in-house' consumer acceptance and consumer preference trials for evaluation of the quality of poultry products is discussed, with reference to examples. These include studies on acceptability of poultry fed diets fumigated with methyl bromide; changes in quality of air- and immersion-chilled chickens during storage at -12° or -20°C; and effects of injection with NaCl and/or polyphosphates on the quality of chickens. Results of these trials are discussed. AJDW

## 154

[Microbiological studies in poultry meat production.]  
Monov, G.

*Veterinarnomeditsinski Nauki* 18 (6) 42-47 (1981) [19 ref. Bg, ru, en] [Tsentralen Nauchnoizsled. Vetmed. Inst. Sofia, Bulgaria]

In a study during 1978-1980 of microbiological conditions in a poultry meat factory processing daily 35 000-40 000 birds by the Stork system, a total of 125 samples (rinsings) from the scalding vat, the eviscerating machine, the skin surface after plucking, eviscerating, and shower washing, the cooling vat, and the skin surface before packaging were taken 1 h after beginning of a shift, in the middle of the shift, and at the end of the shift lasting from 8 a.m. to 3 p.m. Total bacterial counts and coliform counts were determined in each sample. Mean values with s.e. and ranges are tabulated and significance of differences is stated. It was found that surface bacterial contamination increased progressively before shower washing, the most marked increase being at the evisceration stage; that shower washing caused a 78% decrease in total surface counts, and a 90% decrease in surface coliform counts, and that skin contamination before packaging ranged from 3000 to 72 000/ml for total counts and from 100 to 1800/ml for coliform counts. SKK

## 155

Effect of age and sex on meat yield and carcass composition of ducks, geese and muscovy ducks. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Pingel, H.; Schneider, K.-H.  
pp. 28-37 (1981) [7 ref. En] [Lehrstuhl Geflügel, Karl-Marx-Univ., Leipzig, German Democratic Republic]

Studies were conducted to evaluate effects of sex and slaughter age on carcass quality of (i) ducks, (ii) muscovy ducks, and (iii) geese. Slaughter ages considered were: (i) 3-10 wk, (ii) 7-12 wk and (iii) 8-11 wk. Tables of data are given for live wt., % grill-ready wt., neck wt., edible offal wt., top wing, muscle, skin, bone, breast muscle, leg muscle, wing muscle, and residual body for (i), (ii) and (iii). The results are discussed in detail, with reference to optimization of slaughter age. AJDW.

## 156

Instrumental methods of measuring texture of poultry. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

deMan, J. M.; Kamel, B. S.

pp. 157-164 (1981) [21 ref. En] [Dep. of Food Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Instruments for evaluation of the texture of poultry meat are discussed, with special reference to the Warner-Bratzler and Kramer systems. Studies on test methods are briefly described with the aid of tables of data. Aspects considered include: use of muscle strips rather than cylindrical samples; use of 1-3 blades in the Warner-Bratzler system; and the relation between sample wt. and max. force in the Kramer shear cell. It is

concluded that muscle strips 5 cm wide may be used in the Warner-Bratzler cell; max. force readings were proportional to sample wt. and number of blades used in the Warner-Bratzler test. In the Kramer shear test, sample wt. was found to be directly proportional to max. force; peak area (energy) was directly proportional to max. force. Coeff. of variability are lower for the Kramer than for the Warner-Bratzler method; simple sample preparation is a further advantage of the Kramer method. AJDW

## 157

Hygienic aspects of edible poultry (-slaughter-) offal. (In 'Quality of poultry meat' [see FSTA (1982) 14 S2052]) [Lecture]

Marel, G. M. van der; Terbijhe, R. J.; Logtestijn, J. G. van

pp. 95-102 (1981) [15 ref. En] [Dep. of Sci. of Food of Anim. Origin, Fac. of Vet. Med., Utrecht, Netherlands]

Studies were conducted in 3 poultry processing plants to evaluate the bacterial contamination of edible poultry offal (gizzard, heart, liver, neck) processed by various methods. Bacterial counts were determined at 6 stages during processing; also 'packets' of offals were evaluated immediately after removal from the carcass, immediately after packaging and 2.5 h after packaging. Block diagrams of results are given. The results showed, at all stages of processing, that bacteriological quality of necks was much inferior to that of other organs; hygienic quality of necks determines the overall hygienic quality of the offal 'packet'. After packaging, aerobic count of necks is  $10^6$ /g, enterobacteria count is  $10^4$ - $10^5$ /g. Keeping quality of the offal packets is poor, and pathogenic Enterobacteriaceae (e.g. *Salmonella*) may be present. Aerobic counts of gizzards were increased by centrifugation and vacuum transport. Counts increased by a factor of 10 during packaging. Use of clean fresh water during processing had a cleansing effect on the offals. AJDW

## 158

[Detection of oleandomycin residues in meat.]

Rutczynska-Skoneczna, E. M.

*Roczniki Panstwowego Zakladu Higieny* 32 (2) 117-121 (1981) [9 ref. Pl, ru, en] [Ul. Chocimska 24, 00-791 Warsaw, Poland]

A method is described for extraction and TLC detection of oleandomycin residues in poultry meat. Oleandomycin is extracted 3 x from a minced sample of meat (10 g) with 1,2-dichloroethane in alkaline medium. The 1,2-dichloroethane extract is evaporated under a N stream, the dry residue is dissolved in a water-acetonitrile mixture (1:6), defatted with petroleum ether, purified with 10%  $\text{Na}_2\text{CO}_3$  (after previous addition of benzene), and washed with water until the alkaline reaction has stopped. The sample is then dried with anhydrous  $\text{Na}_2\text{SO}_4$ , conc. to a dry mass, and the residue is dissolved in methanol and transferred to a plate covered with a mixture of silica gel G in phosphate buffer pH 8. The chromatogram is developed 2-dimensionally in a mixture of methylene chloride

(neutralized) + benzene + methanol + formalin (80:20:20:4). Compound spots are visualized by spraying the plate with 0.15% solution of xanthydrol in a mixture of conc. HCl and glacial acetic acid (12:1) and heating to 105°C for 5 min; amaranth coloured spots appear in the presence of oleandomycin. The detectability of the method is 100 units/kg poultry meat, with a recovery rate of about 100%. AS

## 159

**Composition of guinea keet breast and thigh meat.**

Hamm, D.; Ang, C.; Hughes, B. L.; Jones, J. E.

*Journal of Food Science* 47 (4) 1372-1373 (1982) [En]  
[USDA, ARS, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Guinea keets, reared to 12 wk on a modified turkey starter and grower diet, were processed like broilers and thigh and breast meat samples analysed. Proximate analysis for breast and thigh meat without skin was: DM 25.4 and 24.0%; protein 22.7 and 19.4%; hexane extractables 0.86 and 2.2%; and ash 1.06 and 1.05%, resp. Total cholesterol in breast meat was 40.6 mg/100 g raw tissue, vs. 62.1 in the thigh. Also included were analyses for Na, K, Ca, Mg, P, thiamin, riboflavin, niacin, pantothenic acid and the fatty acid profiles of the meat and skin. Guinea meat was found to be lower in fat, Na and cholesterol and higher in K, P, thiamin, riboflavin, niacin and vitamin B6 than broiler meat. IFT

## 160

**[Importance of various husbandry and slaughter factors in relation to meat quality.]** Bedeutung einzelner Einflussfaktoren im Bereich Haltung und Schlachtung auf die Fleischqualität.

Augustini, C.; Fischer, K.; Ristic, M.

*Züchtungskunde* 53 (5) 390-399 (1981) [49 ref. De, en, fr, ru] [Bundesanstalt für Fleischforschung, Inst. für Fleischerzeugung & Vermarktung, E.-C.-Baumann-Strasse 20, D-8650 Kulmbach, Federal Republic of Germany]

Literature data on factors adversely affecting meat quality in pigs, cattle and poultry are discussed, with reference to: freedom of movement during rearing; group size; housing systems; genetic predispositions; transport stress; handling at the slaughterhouse; pre-slaughter lairage; and electrical stunning. AJDW

## 161

**Mechanical deboning of poultry and fish. [Review]**

Froning, G. W.

*Advances in Food Research* 27, 109-147 (1981) [92 ref. En] [Dep. of Anim. Sci., Univ. of Nebraska, Lincoln, Nebraska, USA]

Aspects considered in this extensive review include: types of mechanical deboners; composition and nutritive properties of deboned poultry meat and fish (structural characteristics, proximate composition, mineral composition, protein quality, fatty acid and

cholesterol content, bone content, haem pigments); flavour stability (effect of processing variables, storage, interaction with haem pigments, effect of antioxidants, and effect of CO<sub>2</sub> and N<sub>2</sub> cooling); colour stability (influence of processing variables and storage, and changes in myoglobin due to mechanical deboning); functional characteristics (effects of composition, processing variables and food additives); utilization of bone residue; microbial quality; regulations (name and labelling, and limits as regards composition); and research needed. AL

## 162

**Method and apparatus for inserting prepared giblets into dressed slaughter chickens.**Kamphaus, J. (Gebr. Stolle GmbH & Co. KG)  
*UK Patent Application* 2 077 567 A (1981) [En]

Apparatus for inserting giblets packaged in bags into drawn poultry employs a plunger to drive the package through a funnel positioned over the body cavity. IFT

## 163

**[Use of ultrasonic vibrations during immersion freezing of poultry carcasses.]**

Lebedev, V. F.; Shemyakin, Yu. A.

*Myasnaya Industriya SSSR* No. 7, 37-39 (1981) [3 ref. Ru] [Moskovskii Inst. Narodnogo Khozyaistva im. G. V. Plekhanova, Moscow, USSR]

Trials were conducted in which poultry carcasses were frozen in a freezing liquid subjected to ultrasonic oscillation; the ultrasonic treatment reduces freezing time and gives a fine crystal structure in the product. Energy consumption is considered, together with overall hydraulic losses within the system. STI

## 164

**[Use of dry ice for chilling poultry meat.]**

Trumic, Z.; Bogojevic, M.; Lampa, S.; Knezevic, V.; Savic, D.

*Tehnologija Mesa* 21 (11) 329-331 (1980) [8 ref. Sh, en]  
[Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Technological and economic advantages of cooling of poultry carcasses in solid CO<sub>2</sub> were studied. Use of 250 g solid CO<sub>2</sub>/kg poultry cooled carcasses from 27° to 2°C within 2 h. Keeping quality of poultry meat cooled in this way was twice that of conventionally-cooled poultry. STI

## 165

**Improved chilling systems for poultry.**

Lillard, H. S.

*Food Technology* 36 (2) 58-62, 64-67 (1982) [many ref. En] [Richard B. Russell Agric. Res. Cent., ARS, USDA, PO Box 5677, Athens, Georgia 30613, USA]

Improved chilling systems for poultry are proposed. The need to search for improved chilling procedures is discussed with reference to the unenforced EEC Directive of 1971, banning water immersion chilling of poultry. Chilling systems are evaluated with regard to

4 factors to be taken into consideration when evaluating chilling systems: microbiological quality of final product; water uptake; cost of chilling; and acceptability of final product. Systems evaluated include: continuous immersion chilling; cryogenic chilling (liquid N<sub>2</sub> and CO<sub>2</sub>); air chilling; spray chilling; and evaporative chilling with or without vacuum. A table giving a comparison of various broiler chilling methods to immersion chilling is presented. A summation of the search for improved chilling methods is given. From the results it is concluded that cryogenic chilling gives improved flavour and reduced bacterial loads, but is more expensive than immersion chilling, and a continuous plant has not been developed. SP

## 166

[Medicinal baby food - a pressing problem of food research. II.]

Bobis, L.; Rudohradská, A.

*Hydinarsky Priemysel* 23 (9/10) 332-341 (1981) [Sk]

[Vyskumný Ustav Hydinarskeho Priemyslu, Bratislava, Czechoslovakia]

Use of poultry meat in special foods for children suffering from diabetes is discussed with reference to experimental data; advantages of poultry meat over other meats for this application are discussed. STI

## 167

[Development of regression equations for calculating contents of meat, fat and bones in goose carcasses.]

Bochno, R.; Lewczuk, A.; Wawro, E.; Wawro, K.

*Roczniki Naukowe Zootechniki* 8 (2) 33-44 (1981)

[11 ref. Pl, en, ru, de] [Inst. Genetyki i Metod Doskonalenia Zwierząt Akad. Rolniczo-Tech., 10-760 Olsztyn-Kortowo, Poland]

A total of 172 White Italian geese (both males and females) were used in a study on development of equations for prediction of carcass composition. Data are given for the body wt., carcass wt., linear carcass measurements, breast muscle wt. and thickness, and wt. of meat, fat + skin and bone in the carcass; correlations of meat, fat + skin and bone contents with the other variables studied are presented, together with multiple regression equations. The prediction equations developed have multiple correlation coeff. of 0.956 for lean, 0.913 for fat + skin and 0.920 for bone. These equations are based on easily-determined carcass measurements which do not require cutting of the carcass. AJDW

## 168

A decade of poultry products technology research at C.A.R.I. (erstwhile Poultry Research Division, IVRI). Mahapatra, C. M.; Sushil Kumar; Pandey, N. K.

*Indian Poultry Gazette* 65 (3) 67-77 (1981) [46 ref. En] [Cent. Avian Res. Inst., Izatnagar, Uttar Pradesh, India]

Various projects on processing of chicken and quail eggs, and chicken and quail meat and on various poultry by-products, undertaken during the last 10 yr at the Central Avian Research Institute are briefly reported. CFTRI

# CHICKENS

## 1

[The edible portion and nutritional value of freshwater fish and poultry.] Essbarer Anteil und Nährwert von Süßwasserfisch und Geflügel. Steffens, W.

*Ernährungsforschung* 25 (6) 178-180 (1980) [7 ref. De] [Inst. für Binnenfischerei, Berlin-Friedrichshagen, Berlin]

It was established that the proportion of edible material and composition differ relatively little between broiler chickens, trout and carp; all 3 spp. are of high nutritional value; their proteins are of high quality. Edible protein % (live wt. basis) was: carp 8.6, trout 12.2 and broiler 11.6; edible material contents were 54, 61 and 55% resp. All 3 spp. had energy contents of 300-400 kJ/100 g. IN

## 2

Tetrachlorvinphos metabolism in laying hens.

Humayoun Akhtar, M.; Foster, T. S.

*Journal of Agricultural and Food Chemistry* 29 (4) 766-771 (1981) [15 ref. En] [Anim. Res. Cent., Agric. Canada, Ottawa, K1A 0C6, Canada]

Tetrachlorvinphos metabolism was studied, with the aid of a <sup>14</sup>C-labelled compound, in laying hens fed 50 p.p.m. of the insecticide. Approximately 71% of the radioactivity was eliminated in 24 h in excreta. After the final dose, an additional 1.3 and 2.6% of total <sup>14</sup>C was excreted during the next 3 and 7 days. Eggs laid within 24 h of the treatment contained radioactivity. <sup>14</sup>C was also detected in tissues and organs at an insecticide equivalent in the p.p.m. range in kidney, liver, and abdominal fat but in the parts/billion range elsewhere. After dosing was discontinued, the <sup>14</sup>C content of excreta, eggs, tissues, and organs gradually decreased. Compounds identified in excreta were desmethyl tetrachlorvinphos (25%), 2,4,5-trichloromandelic acid (30.5%), and tetrachlorvinphos (1.0%). During the treatment period, all tissues examined contained small amounts of the insecticide, but only traces were detected in tissues and organs from hens killed 7 days after the last dose. AS

## 3

Fried chicken processor bags product saves 30% of cartoning cost.

Anon.

*Quick Frozen Foods* 41 (12) 26 (1979) [En]

Consideration is given to the marketing of frozen fried chicken pieces in a strengthened flexible bag by Victor F. Weaver, Inc., of New Holland, Pennsylvania. The product called 'Chicken to Go' consists of 3½ lb and at least 17 pieces of chicken. The sealing layer of the bag is a 2 mil clear copolymer film, while the bag is made from film ½ mil thicker. The core is a pigmented LDPE, coextruded with 2 clear layers of copolymer film. A nylon layer is added for extra strength and for its property as an O<sub>2</sub> barrier. The bag is a tough, attractive package that costs 30% less than a carton. As the contents are used, the bag occupies less freezer space. Preparation instructions for conventional ovens, microwave ovens and deep fryers are given on the back of the bag. VJG

## 4

Physical and sensory properties of chicken patties made with varying proportions of white and dark spent fowl muscle.

Roland, L. M.; Seideman, S. C.; Donnelly, L. S.; Quenzer, N. M.

*Journal of Food Science* 46 (3) 834-837 (1981) [16 ref. En] [Dep. of Nutr.-Food Sci., S. Dakota Agric. Exp. Sta., S. Dakota State Univ., Brookings, S. Dakota 57006, USA]

Spent fowl was flaked and formulated to include: 100% dark meat; 75% dark meat, 25% white meat; 50% dark meat, 50% white meat; 25% dark meat, 75% white meat; and 100% white meat. Patties were made, and half from each formulation were coated with calcium alginate. Proximate analysis of patties before and after cooking, calculation of cooking loss, and evaluations for textural properties and sensory attributes were performed. As the proportion of white meat increased, the samples contained less fat (9.14 decreased to 3.39% in raw meat), had less cooking loss and shrinkage, and received higher sensory preference scores. Patties coated with calcium alginate were more desirable in texture, flavour, juiciness, and overall palatability as compared to the controls. IFT

## 5

[Quality of chicken meat. I. Effect of age and growth rate on physico-chemical and sensory properties of the meat.]

Touraille, C.; Kopp, J.; Valin, C.; Ricard, F. H.

*Archiv für Geflügelkunde* 45 (2) 69-76 (1980) [24 ref. Fr., en, de, ru] [Sta. de Recherches sur la Viande, INRA Theix, 63110 Beaumont, France]

Studies were conducted on chickens of 2 strains (of different growth rates) of the same genetic origin. Meat characteristics were compared between: birds of the same body wt (i.e. at 9 and 16 wk of age for the 2 strains); birds of the same age (16 wk), body wt being 1.5 and 2.6 kg for the 2 strains; and birds of the same strain at 2 ages (9 or 16 wk). Tables of data are given for the pH, DM content, pigment content, collagen content, collagen solubility, tenderness, juiciness, flavour, overall acceptability, total N concn. and non-protein N, sarcoplasmic N, myofibrillar N and stroma N concn. of the thigh and breast muscle. The pH was lower in thigh than in breast muscle. DM content was higher in the breast muscle than in thigh muscle, in older birds, and in the slower-growing strain. Older birds had higher pigment content in the muscle tissue. Collagen content was higher in thigh than in breast muscle, increased slightly with age, and was higher for birds of the fast-growing strain. Solubility of collagen was influenced by age but not by strain. Concn. of N fractions are little influenced by age in breast meat; in thigh meat, sarcoplasmic N decreases and myofibrillar N increases over the period 9-16 wk of age. Total and non-protein N concn. were appreciably higher in breast than in thigh meat. Age was the main factor influencing organoleptic properties; growth rate had no significant effect.

AJDW

## 6

**[Refrigerating broiler carcasses. II. Effects upon moisture content of tissues.]**

Barros Cotta, J. D. de; Campos, E. J.

*Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais* 32 (3) 453-456 (1980) [8 ref. Pt, en]

32 broiler carcasses were used in a study on effects of packaging and storage on the moisture content of the skin, breast muscle and thigh muscle. Treatments studied were: (i) packaging, freezing at  $-30^{\circ}\text{C}$  for 15 h, then storage at  $-7^{\circ}\text{C}$ , (ii) storage (unpackaged) in ice at  $-2^{\circ}\text{C}$ ; (iii) packaging in  $\text{CO}_2$  in plastics bags impermeable to  $\text{CO}_2$  and storage at  $-2^{\circ}\text{C}$ ; and (iv) packaging and refrigerated storage at  $-2^{\circ}\text{C}$ . The broilers were stored for  $\leq 14$  days; tables of data are given for moisture contents in the tissues studied after storage for 0, 5, 7 or 14 days. Significant differences were observed only for thigh meat, in which (iv) gave significantly higher moisture contents than (i), values for (ii) and (iii) being intermediate. (ii) gave the highest and (i) the lowest moisture contents in breast meat; and (iii) gave the highest and (i) the lowest moisture contents in skin. AJDW

## 7

**Catosal in chickens diets**

El-Amrousi, S.; El-Hammady, H. Y.; Makled, M. N.; Amer, A. A.

*Agricultural Research Review* 55 (7) 1-7 (1977) [5 ref. En] [Fac. of Vet. Med., Assiut Univ., Assiut, Egypt]

300 one-day old Fayoumi chicks were divided into 3 equal groups, 2 of which received Catosal, an organic P preparation mixed with vitamin B<sub>12</sub>, in drinking water at 2 and 3 ml/l, resp., for 16 wk. Catosal administration at 3 ml/l significantly increased body wt., live wt. gain and the % edible parts of the male carcasses, while the changes in these characteristics with the 2 ml/l treatment were not significant. JRR

## 8

**Banquet's precooked chicken processed to be baked off or deep fat fried.**

Anon.

*Quick Frozen Foods* 42 (7) 56, 58 (1980) [En]

Banquet Foods Corporation of St. Louis, Missouri has developed a new-process food service frozen fried chicken, processed by a proprietary method that results in perfect reconstitution whether deep-fat fried or baked. The new line has 3-piece portion packs for 10-oz, 12-oz and 14-oz servings as well as 4-piece 9-cut portion packs for 12-oz, 14-oz and 16-oz servings. There is also an 8-cut Mixed Bulk Pack and a 9-cut Mixed Bulk Pack. Other products such as cubed chicken meat, chicken-based hot dogs, meat pies and bread items are also part of Banquet's food service offerings. VJG

## 9

**The incidence of breast-blister down-grading in broiler chickens.**

Mayes, F. J.

*British Poultry Science* 21 (6) 497-504 (1980) [17 ref. En] [Loughry Coll. of Agric. & Food Tech., Cookstown, County Tyrone BT80 9AA, UK]

A survey was conducted into down-grading due to breast blisters at a large processing plant. The relationships between incidence of down-grading and age, body wt., sex, size of rearing site and its distance from the processing plant, and various weather conditions during the rearing period of each flock were examined using regression analysis. Age and body wt. and rearing site size were the only factors significantly correlated with amount of blistering. AS

## 10

**Analysis of the anti-coccidial drug, halofuginone, in chicken tissue and chicken feed using high-performance liquid chromatography.**

Anderson, A.; Goodall, E.; Bliss, G. W.; Woodhouse, R. N.

*Journal of Chromatography* 212 (3) 347-355 (1981) [1 ref. En] [Dep. of Analytical Chem., Huntingdon Res. Cent., Huntingdon PE18 6ES, UK]

Methods are described for analysis of halofuginone in chicken tissues at concn. as low as 0.001 p.p.m., and in chicken feed at concn. of 3 p.p.m., using HPLC. Tissue analysis involves enzymic release of halofuginone, followed by ethyl acetate extraction under basic conditions, partition into ammonium acetate buffer, and concn. using Sep-pak<sup>TM</sup> C<sub>18</sub> cartridges. HPLC with UV detection is used for final analysis. Precision and accuracy of the method when used for analysis of halofuginone-fortified liver, kidney, muscle, and skin + fat were satisfactory (mean recoveries 81.0-98.7%), and typical chromatograms of extracts from control and fortified tissues are shown. Accuracy of the method was not significantly different over the fortification range studied (0.015-1.03), and recoveries were generally higher from muscle. AL

## 11

**The incidence of bruising in broiler flocks.**

Mayes, F. J.

*British Poultry Science* 21 (6) 505-509 (1980) [11 ref. En] [Loughry Coll. of Agric. & Food Tech., Cookstown, County Tyrone BT80 9AA, UK]

The amount of down-grading due to bruising in 55 flocks of broilers was investigated. Bruising was classified as light or bad bruising and it is suggested that this division represents 2 distinct types of bruises with different causes. The incidence of bruising was greater in female flocks than in male although the bruising in the former tended to be less severe. The relationships between incidence of bruising and several variables associated with the flock and the environment were examined using regression analysis. The factors shown to have a significant influence on the incidence of bruising were: the age and mean wt. of the flock, and the temp. and humidity on the day of processing. AS

## 12

[Chemical characteristics of mechanically deboned meat.]

Dordevic, V.; Trajanoski, C.; Lazarevic, J.; Nikolic, Z.; Sajber, C.

*Tehnologija Mesa* 21 (6) 167-170 (1980) [21 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Data are given for the composition (moisture, protein, lipid, Ca, phospholipids) of mechanically deboned pork from various carcass parts of 7-month-old pigs of the White meat breed, and mechanically deboned meat from the neck and breast of 53-day old chickens. STI

## 13

The effects of pH and levels of organic matter on the death rates of salmonellas in chicken scald-tank water.

Humphrey, T. J.

*Journal of Applied Bacteriology* 51 (1) 27-39 (1981) [37 ref. En] [Sci. Dep., Seale-Hayne Coll, Newton Abbot, Devon TQ12 6NQ, UK]

The immersion scalding of chicken carcasses at 52°C for 2-5 min resulted in the accumulation of bacteria and organic matter in the water. Disassociation of ammonium urate present in chicken faeces caused the pH of the water to fall rapidly from 8.4 to 6.0. This pH was maintained for most of the time the tank was in operation. The change in pH value greatly increased the heat resistance of some common salmonella serotypes with a strain of *Salmonella typhimurium* being the most resistant, having a *D* 52°C value of 34.5 min. The pH value of the water was found to be close to the optimum for the heat resistance of salmonellas. In scald water at pH 5.9-6.0 the death rate of *S. typhimurium* was shown to be independent of organic matter levels indicating that pH was the major influence on heat resistance. AS

## 14

Evaluation of freeze-thaw methods for the reduction of *Salmonella typhimurium* on raw processed poultry.

Olson, V. M.

*Dissertation Abstracts International*, B 41 (8) 2953: Order no. 8102693, 65pp. (1981) [En] [Purdue Univ., West Lafayette, Indiana 47907, USA]

A 5-cycle rapid freeze-rapid thaw (RFRT) treatment resulted in a 99% reduction in the numbers of *S. typhimurium* cells suspended in 50 ml of 0.1% peptone. Portions of chicken wings (ulna and radius with attached skin and muscle) were inoculated with low (16-20 colony-forming units (CFU)/g) and high (approx. 1100 CFU/g) numbers of *S. typhimurium*; the 5-cycle RFRT treatment resulted in a >90% reduction in numbers of bacterial cells on the wings. The 5-cycle RFRT process was used in conjunction with chemical treatment of inoculated chicken wings. Reductions in *S. typhimurium* numbers were as follows: 98% with 5% lactic acid + RFRT; 96% with 5% calcium propionate + RFRT; 96% with 5% potassium sorbate + RFRT; 95% with 20 p.p.m. Cl<sub>2</sub> + RFRT; 95% with RFRT alone. In a pilot plant study (utilizing a CO<sub>2</sub> freezer for

the rapid freeze and a microwave oven for the rapid thaw), wings subjected to 5% lactic acid + RFRT had statistically significantly fewer surviving *S. typhimurium* colonies than wings subjected to 5% lactic acid alone or to RFRT alone. Wings treated with 5% lactic acid alone, RFRT alone and 5% lactic acid + RFRT were stored at 2°C for 22 days; untreated wings served as control. RFRT did not increase the shelf-life when compared to the control. 5% lactic acid alone and 5% lactic acid + RFRT did extend the shelf-life when compared to RFRT alone and to the control. JA

## 15

[Which muscles and bones should be included in "chicken breast"?] Welche Muskeln und Knochen sind dem Geflügelteil "Hähnchenbrust" zuzurechnen? Schulze, K.

*Fleischwirtschaft* 61 (4) 562, 564, 566-567; 605 (1981) [12 ref. De, en] [Veterinäruntersuchungsamt des Landes Schleswig-Holstein, Max-Eyth-Strasse 5, D-2350 Neumünster, Federal Republic of Germany]

The variations in prepared chicken breasts offered for sale are discussed. They are attributed to imprecise definitions in the grading regulations and to mechanical cutting. With the aid of photographs the author suggests the bones and muscle to be included in this cut, based on anatomical relationships in the breast-pectoral girdle area and on consumer expectations. RM

## 16

Attachment of *Salmonella* spp. to chicken muscle surfaces.

Thomas, C. J.; McMeekin, T. A.

*Applied and Environmental Microbiology* 42 (1) 130-134 (1981) [11 ref. En] [Dep. of Agric. Sci., Univ. of Tasmania, Hobart, Tasmania 7001, Australia]

Immersion of chicken muscle fascia in water or physiological saline caused collagen associated with the connective tissue to expand and form a dense network of fibres on the surface. Similar changes were noted for muscle perimysium. 2 test strains of *Salmonella* spp. attached to the collagen fibres only when muscle was immersed for extended times in water. Bacteria did not attach to the fascia or perimysium of muscle that was transiently immersed in suspensions. The presence of NaCl in the suspension media prevented firm attachment, whereas saline rinses removed many attached cells. AS

## 17

Evaluation of five commercial broiler crosses. II. Eviscerated yield and component parts.

Merkley, J. W.; Weinland, B. T.; Malone, G. W.; Chaloupka, G. W.

*Poultry Science* 59 (8) 1755-1760 (1980) [8 ref. En] [USDA, Sci. & Education Administration, Poultry Res. Lab., RD 2, Box 600, Georgetown, Delaware 19947, USA]

Comparative studies were conducted on 5 broiler crosses: (i) Hubbard x Hubbard; (ii) Hubbard x HN; (iii) Hubbard x Shaver; (iv) Ross x Hubbard; and (v) Ross x Arbor Acre, studied in Dec. 1975 and March, June and Sept. 1976. The broilers were slaughtered at 56-57 days of age. Tables of data are given for body wt.,

% yield of eviscerated carcass, abdominal fat pad, liver, gizzard, heart and neck, seasonal variation in % yield of abdominal fat pad, and % yields of breast, back, wing leg and thigh cuts; data are included for both male and female birds. Fresh eviscerated carcass yield was not significantly influenced by cross or sex. Abdominal fat pad yield was significantly influenced by sex (higher in females than males) and cross (highest in (i) lowest in (iv)). Gizzard and neck % did not differ significantly between breeds; % liver was highest in (i), lowest in (iv). (i), (ii) and (iii) had significantly higher % leg but lower % breast than (iv) and (v). Yields of breast back leg and thigh were higher in females than in males. [See *Poultry Science* (1979) 58, 509-515 for part I] AJDW

## 18

### Value of chicken from nutritional standpoint.

Pandey, N. K.; Mahapatra, C. M.; Sushil Kumar  
*Poultry Guide* 18 (6) 27-32 (1981) [3 ref. En] [Cent. Avian Res. Inst, Izatnagar-243 122, India]

The proximate composition, amino acid composition, lipid, phospholipid, neutral lipid, cholesterol, sugar, vitamin and mineral contents of light and dark chicken meat are reported in 7 tables. Chicken meat is recommended as a low energy food. CFTRI

## 19

### The effect of different bird washers on the microbiological quality of broiler carcasses.

Mulder, R. W. A. W.; Bolder, N. M.

*Tijdschrift voor Diergeneeskunde* 106 (14) 124-130 (1981) [11 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA Beekbergen, Netherlands]

The effect of spray washers and inside-and-outside bird washers on the microbiological quality of broiler carcasses was examined in 13 poultry slaughterhouses. The carcasses were sampled by means of the carcass rinse method; total and Enterobacteriaceae counts were estimated. The decrease in total and Enterobacteriaceae counts due to spray washing was as high as with the use of an inside-and-outside bird washer. From this investigation the conclusion can be drawn that the use of an inside-and-outside bird washer does not guarantee microbiological cleaning of the inside of the carcasses (made mandatory by EEC regulations) to a standard better than that achieved with the spray washer. AS

## 20

### Enteropathogenic bacteria in frozen chicken.

Norberg, P.

*Applied and Environmental Microbiology* 42 (1) 32-34 (1981) [8 ref. En] [Nat. Food Administration, 751 26 Uppsala, Sweden]

82 samples of frozen chicken from retail stores were examined for the presence of *Campylobacter*, *Yersinia enterocolitica*, and *salmonellae*. Aerobic plate counts and numbers of coliform bacteria at 37°C were determined. *Campylobacter fetus* subsp. *jejuni* was found in 22% of the samples, *Y. enterocolitica* in 24.5%, and *Salmonella typhimurium* in 1 sample (1.2%). The isolated strains of *Y. enterocolitica* belonged to

serotypes 4, 5b, 6, and 8. Aerobic plate counts and numbers of coliform bacteria at 37°C were not noticeably higher in samples containing pathogens than in pathogen-free samples. This investigation showed that chicken does contain other pathogenic bacteria than *salmonellae*. *Campylobacter* and *Y. enterocolitica* were isolated in much higher frequencies than *Salmonella*. AS

## 21

### [Effects of age and sex on carcass value and meat quality of broilers.] Auswirkungen des Alters und des Geschlechtes auf den Schlachtkörperwert und die Fleischbeschaffenheit bei Broilern.

Ristic, M.; Vogt, H.

*Fleischwirtschaft* 61 (1) 36-37; 104 (1981) [2 ref. De, en]

160 male and female broiler carcasses were evaluated for carcass and meat quality after 5, 6, 7 and 8 wk for pre-slaughter or slaughter wt, % valuable cuts, edible internal organs, % grilling loss, juiciness, flavour, and objective tenderness (breast and leg muscle). The carcass yield (ready for grilling or oven-ready) increased, and the % of internal organs decreased with age. Sex had no significant effect. The optimum meat:fat and meat:bone ratios were obtained at 8 wk in female broilers, and rose with time after 6 wk in male broiler carcasses. Female broiler carcasses contained significantly more fat than male ones. In breast meat, lowest grilling loss (14%) was observed after 8 wk. Best flavour and tenderness was recorded after 8 wk for male, 7 wk for female broilers. RM

## 22

### Determination of TBA number by high performance liquid chromatography.

Kakuda, Y.; Stanley, D. W.; Voort, F. R. van de  
*Journal of the American Oil Chemists' Society* 58 (7) 773-775 (1981) [15 ref. En] [Dep. Food Sci., Univ. of Guelph, Guelph, Ontario, Canada]

An HPLC method for the quantitation of malonaldehyde in aqueous distillates was developed. Compared with the standard TBA test, the HPLC method was faster, and less affected by side reactions. A total of 5 min was necessary to assay each distillate and only malonaldehyde was detected. The standard curves were reproducible and standards were stable for up to 6 days. The HPLC method could detect malonaldehyde levels ranging from  $1 \times 10^{-11}$  to  $4 \times 10^{-11}$  mol/10  $\mu$ l and either peak height or peak area could be used to measure the malonaldehyde concn. The coeff. of detn. between absorbance values determined by the TBA test and peak heights determined by HPLC was 0.946. 21 freeze-dried chicken samples with TBA numbers ranging from 3.93 to 16.6 were used for this correlation. AS

## 23

### Free fatty aldehydes and their aldol condensation products in heated meat.

Suyama, K.; Arakawa, T.; Adachi, S.

*Journal of Agricultural and Food Chemistry* 29 (4) 875-878 (1981) [15 ref. En] [Lab. of Anim. Products Tech., Tohoku Univ., Sendai 980, Japan]

The production of  $\alpha,\beta$ -unsaturated aldehydes ( $\alpha,\beta$ -UA) in heated meat has been shown to be due to a

series of reactions, starting with hydrolysis of plasmalogen to free fatty aldehydes. The subsequent aldol condensation reaction of the free fatty aldehydes thus formed may occur by catalysis by amino groups of meat constituents to give  $\alpha,\beta$ -UA. The percentage compositions of the fatty aldehydes and  $\alpha,\beta$ -UA in heated (110°C for 30 min) beef, pork, and chicken meats were determined by GLC.  $\alpha,\beta$ -UA were regenerated from their DNPH derivatives by titanium trichloride and charged on GLC. Free state C12-C18 aldehydes were present in all the heated meats. The percentage compositions of these fatty aldehydes were the same as the percentage compositions of plasmalogen-bound aldehydes. Hexadecanal (47.2-65.3%) and octadecanal (14.0-29.8%) were the most predominant fatty aldehydes, and 2-tetradecyloctadec-2-enal (35.4-46.3%) was the predominant  $\alpha,\beta$ -UA. AS

## 24

High pressure liquid chromatographic determination of methyl and propyl *p*-hydroxybenzoates in comminuted meats.

Perfetti, G. A.; Warner, C. R.; Fazio, T.

*Journal of the Association of Official Analytical Chemists* 64 (4) 844-847 (1981) [10 ref. En] [FDA, Div. of Chem. & Physics, Washington, DC 20204, USA]

A method was developed for determining methyl and propyl *p*-hydroxybenzoates (methyl and propyl parabens) in comminuted meats. The parabens were extracted from the meat sample with acetonitrile. After filtering, the extract was analysed by reversed phase HPLC, using a 254 nm absorbance detector. Samples of bologna, chicken roll, and chopped ham were fortified with approx. 100, 200, and 400 p.p.m. of each paraben. Average recoveries were 92% for methyl paraben and 94% for propyl paraben. AS

## 25

Production and carcass characteristics of the broiler chicken.

Leeson, S.; Summers, J. D.

*Poultry Science* 59 (4) 786-798 (1980) [7 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada]

This paper includes data for growth and carcass characteristics of male and female broiler chickens reared on commercial diets, groups being slaughtered at 1, 7, 14, 21, 28, 35, 42, 49, 56, 63 and 70 days of age. The data given include body wt., % total viscera, abdominal fat, liver, heart, gizzard + proventriculus, ovaries and alimentary tract, % yields of commercial cuts, and the DM, protein and fat contents of the carcass and offal. Linear and quadratic relationships between broiler age and the characteristics studied are also presented.

AJDW

## 26

Minimizing *Salmonella* contamination on broiler carcasses with poly(hexamethylenebiguanide hydrochloride).

Thomson, J. E.; Cox, N. A.; Bailey, J. S.; Islam, M. N. *Journal of Food Protection* 44 (6) 440-441, 444 (1981) [12 ref. En] [Richard B. Russell Agric. Res. Cent., SEA, USDA, PO Box 5677, Athens, Georgia 30613, USA]

Broiler carcasses, each inoculated with 30 cells of marker *Salmonella heidelberg*, were prechilled and chilled together with uninoculated carcasses in a simulated commercial chilling system. When either 10 or 25 p.p.m. of PHMB [poly(hexamethylenebiguanide hydrochloride)] was added to the prechill water, cross-contamination (uninoculated carcasses showing contamination with marker *Salmonella* after chilling) was prevented, and no viable *Salmonella* were found on the inoculated carcasses. When carcasses, each inoculated with 60 000 cells of marker *Salmonella*, were similarly chilled, and 10 p.p.m. of PHMB was added to the prechill water, cross-contamination was not prevented, and viable *Salmonella* were found on the inoculated carcasses. With 60 000 cells, and 25 p.p.m. PHMB, cross-contamination was prevented, but viable *Salmonella* remained on the inoculated carcasses. AS

## 27

Injectable-delectable: new process offers more tender poultry.

Cunningham, F. E.; Francis, C.

*Feedstuffs* 53 (37) 33 (1981) [En] [Kansas State Univ., Manhattan, Kansas 66506, USA]

Pineapple- and barbecue-flavoured solutions containing 0.025 and 0.05% papain were injected into raw turkey drumsticks and roasting chicken breasts, which were cooked in a microwave or a conventional oven. Cooked pieces were analysed for shear press values and taste panel evaluations of flavour, juiciness and tenderness. In all cases, injection significantly increased product tenderness and juiciness, and the taste sensations were approved of. LH

## 28

[Effect of bromelain on the protein complex of chicken meat.]

Burica, O.; Vitez, L.

*Tehnologija Mesa* 22 (1) 26-30 (1981) [10 ref. Sh, en] [Kemijski Inst. "Boris Kidric", Lyubljana, Yugoslavia]

A process for preparation of a powdered hydrolysate from chicken meat is described. Red and white chicken meats are cleaned, defatted, mixed with water at a ratio of 1:2, and homogenized; the resulting suspension is heated to 40-50°C, 0.5-1.5% bromelain is added, and the mixture is adjusted to pH 6.0-6.5 and held for 5 h. The enzyme is then inactivated by heating at 85°C for 15 min. The hydrolysate is centrifuged to remove insoluble matter; the solution is then freeze-dried. The dry product is soluble, has a good taste and odour and is light in colour. It contains 14.0-14.8% N. Data are given for amino acid composition. STI

## 29

Effect of preparation and service on the thiamin content of oven-baked chicken.

Lee, F. V.; Khan, M. A.; Klein, B. P.

*Journal of Food Science* 46 (4) 1560-1562 (1981) [En] [Dep. of Foods & Nutr., 274 Bevier Hall, Univ. of Illinois, Urbana, Illinois 61801, USA]

Chicken breast halves were oven-baked and evaluated for thiamin content when prepared and served under a cafeteria-style food service system. After preparation, they were held on a steam table for 90 min, frozen stored for 4 wk and finally reheated using

conventional and microwave ovens. Thiamin detn. were conducted on raw, cooked, hot-held, frozen-cooked and reheated samples. The mean total % cooking losses for the freshly cooked chicken were  $20.4 \pm 10.9\%$ . The steam table holding for 90 min resulted in  $4.4 \pm 0.7\%$  evaporation losses. The mean % evaporation losses for the microwave reheated chicken were not significantly different from those of the conventionally reheated samples. No significant differences were noted in the moisture and fat content among various treatments. The thiamin content of raw meat when calculated on a dry, fat-free basis was significantly higher than the thiamin content of the cooked meat. There were no significant differences in the thiamin content after various treatments. IFT

### 30

[Residues of chlorinated aromatic hydrocarbons in fish meals, meat-and-bone meals, feed mixtures and meat of broiler chickens.]

Falandysz, J.; Rozycza, B.

*Roczniki Państwowego Zakładu Higieny* 31 (4) 383-387 (1980) [12 ref. Pl, ru, en] [Wojewódzka Sta. Sanitarno-Epidemiologiczna, Gdańsk, Poland]

Mean contents of total DDT in meat of groups of approx. 20 chicken broiler given for 8 wk rations containing resp. 0, 6, 12 or 24% fish meal were resp. 0.04, 0.08, 0.06 and 0.10 mg/kg tissue. Corresponding contents of polychlorinated biphenyls were, resp.: traces, 0.009, 0.013 and 0.024 mg/kg tissue. SKK

### 31

Reduction of numbers of *Salmonella typhimurium* on poultry parts by repeated freeze-thaw treatments.

Olson, V. M.; Swaminathan, B.; Stadelman, W. J.

*Journal of Food Science* 46 (5) 1323-1326 (1981) [En] [Food Sci. Inst., Purdue Univ., W. Lafayette, Indiana 47907, USA]

Cells of *Salmonella typhimurium*, suspended in 50 ml of 0.1% buffered peptone were subjected to 5 cycles of rapid or slow freezing and rapid or slow thawing. A 5 cycle rapid freeze-rapid thaw process was found to be an effective treatment resulting in 99% reduction in the numbers of *S. typhimurium* cells. Of the surviving cells after treatment, 75% was sublethally injured. The 5 cycle rapid freeze-rapid thaw process was investigated for its effectiveness in reducing numbers of

*S. typhimurium* cells on experimentally inoculated chicken wings. The part of chicken wings consisting of ulna and radius with attached skin and muscle was inoculated with low (16-20 colony forming units [CFU]/g) or high (1100 CFU/g) numbers of *S. typhimurium* and each wing was subjected to 5 cycles of the rapid freeze-rapid thaw process. There was >90% reduction in the numbers of *S. typhimurium* cells on the chicken wings after the freeze-thaw treatment. IFT

### 32

[Flameless atomic absorption determination of lead and cadmium in poultry products.]

Martynyuk, T. G.; Sevast'yanova, N. I.; Nikolaeva, V. A.; Mukhtarov, E. I.

*Voprosy Pitaniya* No. 2, 16-19 (1981) [4 ref. Ru]

[Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

Variations in the AAS technique (e.g. use of  $\text{HNO}_3$ ,  $\text{HCl}$  or aqua regia for ashing) were assessed in determining Cd and Pb content in chicken muscle and liver tissues and in hens' egg samples; possible sources of error (e.g. effect of background absorption) are also discussed. A comparison was also made between detn. by a calibration method and a standard reference method (good agreement was obtained between the 2 methods). Recoveries from samples spiked with 0.25-1 mg Pb/kg or 0.050-0.200 mg Cd/kg, and method reproducibility are also tabulated (the latter was lower than levels reported elsewhere in the literature). RAW

### 33

[Properties of lipids produced during enzymic hydrolysis of chicken bone.]

Ishida, K.; Kaji, Y.; Yamamoto, A.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 27 (1) 14-19 (1980) [19 ref. Ja, en] [Food Tech. Development Lab., Tsuchiura Plant, Kyowa Hakko Kogyo Co. Ltd, Ami-machi, Ibaraki-ken, Japan]

In connection with the need to stabilize the lipids in chicken bone hydrolysates intended for use as flavorants, studies were made of the chemical properties of the lipids and of the effect of various chicken bone components on lipid oxidation. The lipids obtained by cooking chicken bone had a good aroma, contained a very low level of phospholipids and were relatively stable to oxidative rancidity. Lipids obtained by the enzymic proteolysis of chicken bone had a roast chicken-like aroma and contained approx. 3% phospholipids; lipids remaining in the insoluble fraction after proteolysis had a high phospholipid content and were very susceptible to oxidation. Both the cooking extract and the enzymic hydrolysate showed an antioxidative activity towards lipids, while the insoluble fraction and a cold water extract of chicken bone had a prooxidative activity. Since lipid oxidation catalysed by these prooxidants could be prevented by the combined use of polyphosphate and ascorbate, it is concluded that the prooxidative activity is related to the presence of haemoprotein and inorganic Fe. [From En summ.] JA

### 34

High humidity food chilling system.

Williams, C. E. (Hester Industries Inc.)

*United States Patent* 4 271 683 (1981) [En]

Warm food products e.g. fish, meat or chicken products that may come directly from a cooker or previous food processing unit, are chilled to a sanitary storage temp. approaching 0°C without dehydration by introducing them into a cold humid 100% humidity chamber. Humidity is regenerated by spraying refrigerated water and the products are passed through a chilling chamber on a conveyor belt with a spiral path.

Various cabinet features reduce input energy and provide sanitary conditions, such as supplying sanitary water, and filtering droplets of water from the cold moist air to avoid contamination or product disfiguring drip. Provisions are made to prevent a moving conveyor belt from carrying warm air into the chiller or from carrying cold air out of it as it passes continuously through the chiller cabinet. All lubricated mechanical equipment is mounted external to the food processing chilling chamber and access doors ensure sanitation. The water spray chamber and water flow paths are simply sanitized by replacing the water with a detergent solution. AS

## 35

[Suitability of coarse rapeseed meals produced by various techniques for broiler chicken fattening.]

I. Results from a fattening and nitrogen balance experiment, including carcass evaluation.] Über die Eignung nach verschiedenen Verfahren hergestellter Rapsextraktionsschrote für die Broilermast. I. Ergebnisse eines Mast- und Bilanzversuches einschließlich Schlachtkörperbeurteilung.

Kozlowski, M.; Faruga, A.; Kozlowska, H.; Lossow, B.; Mieth, G.; Brückner, J.; Bock, H.-D.; Ohff, R. *Nahrung* 25 (4) 365-370 (1981) [9 ref. De, en, ru] [Agric.-Tech. Akad. Olsztyn, Poland]

A total of 580 White Rock x Cornish broilers was used in a feeding trial (from 1 to 56 days of age) conducted to evaluate effects of various rapeseed meal types (subjected to diffusion extraction, chemical hydrolysis, or additional washing, or meal prepared from dehulled rapeseed) on performance and quality. The diets tested contained 10% rapeseed meal; a control rapeseed meal-free diet was also tested. Tables of results are given for growth and carcass quality characteristics (including fat-free leg and breast muscle wt., muscle pH 24 h post mortem, water holding capacity, colour lightness and crude protein content of the meat.) The results show no effect of a dietary level of 10% of any of the rapeseed meals on the carcass and meat quality characteristics studied; all the rapeseed meals adversely affected wt. gain, this effect being least for samples prepared with additional diffusion extraction and/or washing operations. AJDW

## 36

From ashes to new plant in 290 days.

Anon.

*Poultry International* 19 (13) 66-68, 70, 110, 114 (1980) [En, de, it, fr, es, ja, ar]

Reconstruction of the Farmer's Table broiler processing plant at Lymington, Hampshire, UK after destruction by fire is discussed. The reconstructed factory (throughput 130 000 birds/wk) is described, with reference to delivery of broilers, stunning, killing, bleeding, scalding, defeathering, carcass washing, inspection, removal of heads and feet, evisceration, separation of edible offal, carcass chilling, grading, weighing, cutting into portions, packaging, freezing and frozen storage. AJDW

## 37

Identifying broiler processing plant high electrical use areas.

Carr, L. E.

*Transactions of the ASAE* 24 (4) 1054-1057 (1981)

[En] [Agric. Eng. Dep., Univ. of Maryland, College Park, USA]

A representative broiler processing plant was surveyed to determine high electrical use areas. Electrical consumption for 22 plant areas was estimated by converting all electrical uses to horsepower and by using plant operational records for time-and-motion data. 5 areas accounted for approx. 74% of the electricity consumed. A 28-day time-and-motion and electrical consumption study was conducted on an evisceration line to evaluate the estimation procedure used. The electrical consumption measured was 9.3% less than estimated. AS

## 38

[Quality of chicken meat. II. Changes in physicochemical characteristics and organoleptic properties of the meat with age.]

Touraille, C.; Ricard, F. H.; Kopp, J.; Valin, C.; Leclercq, B.

*Archiv für Geflügelkunde* 45 (3) 97-104 (1981) [20 ref. Fr, en, de, ru] [Sta. de Recherches sur la Viande, INRA, Theix 63110 Beaumont, France]

Studies were conducted on thigh and breast muscle of male broilers of an experimental strain, slaughtered at 8, 10, 12, 14 or 16 wk of age. Data are presented for wt. and % breast muscle and thigh muscle, and the pH and DM, myoglobin, total and soluble collagen, total N, myofibrillar N, total lipid and phospholipid contents of these 2 muscles, together with results of sensory evaluation. The results show that collagen solubility, lipid content, tenderness and juiciness decrease and flavour intensity increases with increasing age. Myoglobin content of thigh meat (but not breast meat) increases with increasing age. Taste panels rated overall acceptability highest at 14 wk of age. Tenderness appeared to be related to collagen solubility; juiciness may be related to collagen and lipid content. No clear relationship between flavour and physicochemical characteristics was observed. Differences in physicochemical and organoleptic characteristics between breast and thigh meat are discussed. AJDW

## 39

[Effects of an  $\alpha$ -glucosidase inhibitor on growth and body composition of broilers.]

Kirchgessner, M.; Roth, F. X.; Spoeri, R.

*Archiv für Geflügelkunde* 45 (3) 125-132 (1981) [16 ref. De, en, fr, ru] [Inst. für Ernährungsphysiologie, Tech. Univ. München, 8050 Freising-Weihenstephan, Federal Republic of Germany]

540 male Lohmann broiler chicks were used in a 6-wk trial conducted to evaluate effects of the  $\alpha$ -glucosidase inhibitor Bay g 5421 (BG5) on growth and body composition. Treatments tested were: (i) no BG5; (ii) feed with 25 mg BG5/kg fed throughout; (iii) feed with 50 mg BG5/kg, fed throughout; (iv) 25 mg BG5/kg feed for the last 3 wk before slaughter; (v) 50 mg BG5/kg

feed for the last 3 wk; and (vi) 100 mg BG5 for the last 3 wk. Tables of results are given, including data for the composition of the whole body and the thigh and breast muscles. DM and fat content of the carcasses decreased and protein content increased with increasing level of BG5 in the diet. Data for composition of thigh and breast muscle show similar trends. AJDW

## 40

[Various Cd compounds in feed for laying hens and broilers.] Einsatz verschiedener Cadmiumverbindungen im Broiler- und Legehennenfutter.

Nezel, K.; Matthes, S.; Vogt, H.

*Archiv für Geflügelkunde* 45 (3) 120-125 (1981) [6 ref. De, en, fr, ru] [Inst. für Kleintierzucht, Forschungsanstalt für Landw., D-3100 Celle, Federal Republic of Germany]

Groups of Lohmann broiler chicks and LSL (Leghorn type) laying hens were fed diets with 0, 20 or 40 p.p.m. Cd as cadmium acetate, cadmium-cysteine or CdS. The broilers received the experimental diets for  $\leq 49$  days, the laying hens for 336 days. Data are given for growth of the birds, and for Cd concn. in tissues, and elastic deformation characteristics of the egg shell. The results show that both cadmium acetate and cadmium-cysteine caused Cd accumulation in tissues (max. 300 p.p.m. in kidneys of laying hens fed cadmium acetate). The Cd concn. in tissues increased with increasing Cd concn. in the diet, and duration of feeding of the Cd-containing feeds. Little Cd accumulated in muscle tissue on any diet. Cadmium acetate impaired shell stability of the eggs. CdS, which is of low solubility, did not affect elastic deformation of the shell, and caused only slight accumulation of Cd in the tissues. AJDW

## 41

The influence of fryer temperature and raw weight on fry time of deep-fat fried chicken thighs.

Læe, R. H.; Muir, W. M.; Mullins, S. G.

*Poultry Science* 59 (11) 2467-2469 (1980) [9 ref. En] [Univ. of Kentucky, Lexington, Kentucky 40506, USA]

Raw, breaded chicken thighs were fried at 3 different temp. (163°, 177°, and 191°C) to an internal end-point temp. of 93°C. Fry time decreased with increasing fryer temp. ( $P < 0.001$ ). A regression equation was established for predicting fry time as a function of average raw thigh wt. at each fryer temp. In the range investigated neither number of pieces nor fryer load affected fry time at 163°C ( $P > 0.05$ ).

## 42

Cornell's new chicken product.

Anon.

*Poultry International* 19 (13) 96, 98, 111, 113 (1980) [En, it, fr, es, de, ja, ar]

A new high-protein, low-fat chicken meat product developed at Cornell University is described. It comprises meat mechanically separated from the carcasses of hens culled at the end of their useful life as layers. Applications include use in pies, casseroles, patties and hamburgers. An initial market trial gave good results. AJDW

## 43

[30% reduction of protein level in, and amino acid supplementation of, feeds for broilers.]

Jamroz, D.; Schleicher, A.; Fritz, Z.

*Roczniki Naukowe Zootechniki* 8 (1) 209-219 (1981) [13 ref. Pl, en, de, ru] [Inst. Zywienia Zwierząt i Gospodarki Paszowej, AR, ul. C. Norwida 25, 50-375 Wrocław, Poland]

880 Euribrid broilers were used in a feeding trial in which effects of reduction of the protein content of the diet (from 20 to 17% or from 16.7 to 14.6%), with or without supplementation with synthetic methionine and lysine, on growth and carcass quality were studied. Tables of results are given, including data for dressing %, wt. of breast muscle, giblets, liver and spleen, and DM and protein concn. in the breast muscle and liver. No significant effect of the feed variations tested on carcass quality were observed. AJDW

## 44

[Use of complete feed mixtures with decreased protein and energy levels in broiler chicken fattening.]

Schleicher, A.; Jamroz, D.; Fritz, Z.

*Roczniki Naukowe Zootechniki* 8 (1) 221-233 (1981) [17 ref. Pl, en, de, ru] [Inst. Zywienia Zwierząt i Gospodarki Paszowej AR, Ulica C. Norwida 25, 50-375 Wrocław, Poland]

878 Euribrid broilers were used in a feeding trial conducted to evaluate effects of reduction of the protein content of the diet (from 19/16% to 17/15%), the energy content of the diet (2900 or 2700 kcal/kg) and replacement of dietary fish meal by vegetable protein + synthetic lysine and methionine on performance and carcass quality. Tables of results are given. Reducing protein content of the diet did not affect carcass quality of the composition of the breast muscle and liver. Vegetable protein + amino acids gave results equivalent to those achieved with fish meal-containing diets. Little effect of the dietary energy levels studied on carcass quality was observed, although the lower-energy diet reduced wt. gain. AJDW

## 45

Effect of cooking rates in electric or microwave oven on cooking losses and retention of thiamin in broilers.

Hall, K. N.; Lin, C. S.

*Journal of Food Science* 46 (4) 1292-1293 (1981) [10 ref. En] [Dep. of Nutr. Sci., Univ. of Connecticut, Storrs, Connecticut 06268, USA]

A study was conducted to determine the effect of 2 microwave oven and 2 electric oven cooking rates on retention of thiamin and cooking losses with broiler chickens. Thiamin was determined by a microbiological bidimetric assay of raw and cooked meats. Broilers cooked in the microwave oven retained more thiamin than broilers cooked in the electric oven. There was no difference in thiamin retention between broilers cooked in the microwave oven at 800 and 1600 W. Broilers cooked in the electric oven at 204°C retained more thiamin than broilers cooked at 121°C. Broilers cooked in a 600 W microwave oven had the greatest wt. loss. Difference in wt. loss occurred between broilers cooked in an 800 W, 121°C or 204°C oven. IFT

46

**A comparison of two watering systems for broilers.**  
Tugwell, R. L.; Goan, H. C.  
*Tennessee Farm and Home Science* No. 115, 12-13  
(1980) [3 ref. En]

Broiler chicks were given (i) conventional trough watering, or (ii) nipple watering at 11-24 birds/nipple in 2 trials, up to processing at 52 days. During the hot summer months (ii) gave fewer birds with breast blisters needing to be trimmed at processing; fewer birds/nipple increased the final wt of broilers; (ii) was able to accomodate 1 day old chicks, whereas (i) needed an initial supplementary system. LH

47

**Sensory profile studies on broth quality problems.**  
Rothe, M.; Kirova, E.; Schischkoff[Shishkov], G.  
*Nahrung* 25 (6) 543-552 (1981) [7 ref. En, de, ru] [Cent. Inst. of Nutr., Potsdam-Rehbrücke, German Democratic Republic]

Various factors affecting the quality of meat broths, e.g. the raw material and processing methods used, were studied by sensory profile methods by 2 test groups, in Sofia and Rehbrücke. The flavour of meat broths can be altered by the muscle type used (*longissimus dorsi* and/or *gluteus major*) and additional fat tissues and bones. The retention of volatile compounds was also an important factor: better quality broths were obtained by cooking in a closed system. Beef, pork and mutton broths had similar flavour after removal of fats and solids, whereas chicken subjected to the same treatment had chicken-like nuances. This is due to the high content of polyunsaturated fatty acids in the fat tissue of chicken, and presence of fat oxidation products: beef broth mixed with highly unsaturated vegetable oils also had chicken-like nuances. IN

48

[Studies on the effect of supplementation of broiler diet with synthetic amino acid. III. Effects of D,L-methionine and L-lysine addition to broiler diet on meat production.]

Kim, D. J.; Kim, Y. K.; Bang, K. S.; Ko, K. D.; Kwack, C. H.

*Korean Journal of Animal Science* [Hanguk Ch'uksan Hakhoe Chi] 23 (2) 136-143 (1981) [15 ref. Ko, en] [Coll. of Agric., Dong A Univ., Busan, S. Korea]

The effect of adding methionine and lysine to broiler diets at (i) control (lower amino acid level than NRC feeding standard, 1977), (ii) equal methionine and lysine to NRC level, (iii) higher methionine and lysine level than NRC, (iv) basal diet + equal methionine level to NRC, (v) basal diet + equal lysine level to NRC, were investigated. The eviscerated wt of (iii) ( $1698 \pm 20$  g) was heavier than (iv) and (v) at  $P < 0.05$ , and the edible meat yield of (iii) ( $1069 \pm 12$  g) was the largest. Fat content of meat from males was higher than that of females. Thus lysine and methionine supplementation was valuable, but it proved uneconomical on further testing. [From En sunm.] [See *Korean Journal of Animal Science* (1981) 23 (2) 130-135 for part II]. LH

49

**Thiamin content, texture, and sensory evaluation of postmortem papain-injected chicken.**  
Prusa, K. J.; Chambers, E. IV; Bowers, J. A.; Cunningham, F.; Dayton, A. D.  
*Journal of Food Science* 46 (6) 1684-1686 (1981) [En] [Dep. Food & Nutr., Kansas State Univ., Manhattan, Kansas 66506, USA]

Taste panel scores, Instron measurements, and thiamin, fat, and moisture contents from microwave and conventionally cooked roasting chickens, injected with distilled water and papain solution (0.001 and 0.002%) were determined. Moisture, fat, and thiamin contents and cooking losses were not significantly affected by treatment. For papain injected samples, Instron measurements were less than those for uninjected samples when fibres were separated against the grain. Papain injected samples were more tender and mealier than uninjected samples. Roast chicken flavour was unaffected, but off-flavour increased in the papain-injected samples. Generally, cooking methods did not affect sensory scores. IFT

50

**Effect of freezing broiler drumsticks on breading adhesion.**

Suderman, D. R.; Cunningham, F. E.

*Journal of Food Science* 46 (6) 1953-1955 (1981) [En] [Dep. of Anim. Sci., Kansas State Univ., Manhattan, Kansas 66506, USA]

Broiler drumsticks were used to determine whether freezing poultry parts prior to breading application affected coating adhesion. So fresh drumsticks were compared to 50 frozen/thawed drumsticks. Results showed freezing improved coating adhesion, but not significantly. IFT

51

**Influence of batter viscosity on breading of chicken drumsticks.**

Cunningham, F. E.; Tiede, L. M.

*Journal of Food Science* 46 (6) 1950-1952 (1981) [En] [Dep. of Anim. Sci., Kansas State Univ., Manhattan, Kansas 66506, USA]

The effects of batter viscosity on breading pickup and cooking losses are reported here. A dry batter mix was blended with water to prepare batters of increasing viscosity. Chicken drumsticks were towel dried, weighed, dipped in batter, dredged in breading, reweighed, then deep fat fried. As batter viscosity increased, the amount of breading picked up increased. Cooking losses were least and breading adhesion best from those drumsticks dipped in batters having a 1:2 water:solids ratio. Poorest adhesion of breading was noted for drumsticks dipped in batters of low viscosity having a 2:1 water: solids ratio. IFT

## 5.2

**A note on basic composition of spent hen meat.**

Nageswara Rao, K.

*Indian Poultry Gazette* 65 (1) 25-26 (1981) [6 ref. En]  
[Cent. Avian Res. Inst., Izatnagar-243 122, India]

The moisture content of the breast and thigh muscles of 20-wk-old pullets (76%) was significantly higher than that of the same muscles of 80-wk-old spent hens (74%). The protein content of breast muscle was significantly higher than that of thigh muscle (23% and 19.82% resp.) of spent hens; the fat content of thigh muscle was significantly higher than that of breast muscles in pullets and spent hens. CFTRI

## 53

**Comparison of rabbit, beef, and chicken meats for functional properties and frankfurter processing.**

Whiting, R. C.; Jenkins, R. K.

*Journal of Food Science* 46 (6) 1693-1696 (1981) [En]  
[USDA-ARS, E. Reg. Res. Cent., 600 E. Mermaid Lane, Philadelphia, Pennsylvania 19118, USA]

The functional properties of rabbit meat were compared with those of beef and chicken meats. Protein solubilities, water-holding capacities, emulsifying capacities, and binding strengths were approx. equal. Frankfurter emulsions made from rabbit and chicken were formed more easily than those from beef, and were more stable. Frankfurters from beef were firmer and coarser in texture. Sensory evaluations for flavour, texture, and overall acceptability demonstrated that frankfurters made from rabbit meat were equal to those from beef and slightly superior to those from chicken. Quality and sensory scores for rabbit frankfurters containing 15% protein, 20% fat and 1.7% salt were also very acceptable. IFT

## 54

**An investigation into the formation of N-nitrosamines in heated chicken frankfurters.**

Gray, J. I.; Bussey, D. M.; Dawson, L. E.; Price, J. F.; Stevenson, K. E.; Owens, J. L.; Robach, M. C.

*Journal of Food Science* 46 (6) 1817-1819 (1981) [En]  
[Dep. of Food Sci. & Human Nutr., Michigan State Univ., E. Lansing, Michigan 48824, USA]

Chicken frankfurters, prepared with various levels of sodium nitrite (0, 20, 40, 60, 100, and 156 p.p.m.) were heated either in a microwave oven, boiled or broiled and then analysed for *N*-nitrosamines. As expected, "apparent" *N*-nitrosamine levels increased with increasing concn. of sodium nitrite. The effect of the various heating procedures on *N*-nitrosamine formation was inconclusive, due possibly to the low levels of "apparent" *N*-nitrosamines present. The 2 most common *N*-nitrosamines present appeared to be *N*-nitrosodimethylamine and *N*-nitrosomorpholine. However, only in the frankfurter samples prepared with 156 p.p.m. nitrite was the presence of *N*-nitrosomorpholine confirmed by MS. IFT

## 55

***Campylobacter* spp. in oven-ready poultry.**

Simmons, N. A.; Gibbs, F. J.

*Journal of Infection* 1 (2) 159-162 (1979) [7 ref. En]  
[Dep. of Clinical Bact. & Virology, Guy's Hospital, London SE1 9RT, UK]

An investigation was carried out to see the extent to which *Campylobacter* spp. present in chickens and turkeys on farms, can survive the process to which the birds are subjected to prepare them for sale as oven-ready poultry. *Campylobacter jejuni* was isolated from the caecal contents of 36 of the 50 birds after evisceration (72%) and from the cavities of the same 36 birds just prior to packaging. It was still present in 24 (48%) after refrigerated delivery to simulated point of sale. In a further investigation, *C. jejuni* was isolated from 20 of the 25 air-chilled chickens (80%), 8 of the 10 water-chilled chickens (80%), 5 of the 6 air chilled turkeys (83%) and all 6 water-chilled turkeys (100%). After swabs had been taken the birds were deep frozen at -20°C and after 3 wk 14 of the frozen chickens from which campylobacters had been isolated were re-examined. *C. jejuni* was recovered from 6 of the 14 (43%) chickens. VJG

## 56

**Effect of pH on TBA values of ground raw poultry meat.**

Chen, T. C.; Waimaleongora-Ek, C.

*Journal of Food Science* 46 (6) 1946-1947 (1981) [En]  
[MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

Hand-deboned raw broiler meat was ground through a meat grinder and adjusted to pH values of approx. 3, 5, 7, and 9. The prepared samples along with the controls were covered and stored at 2-4°C. The 2-thiobarbituric acid (TBA) values of the samples were measured immediately after sample preparation and during refrigerated storage for a period of 14 days. The pH values affected the lipid oxidation of ground raw meat as measured by the TBA test. The lower the pH values, the stronger the pro-oxidant affect. Adjusting the pH values of ground raw poultry meat to neutral or alkaline slowed the increase in TBA values. IFT

## 57

**[Studies on the quality changes of chicken muscle during cold storage.]**

Choe, B. K.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 22 (6) 516-527 (1980) [46 ref. Ko, en] [Coll. of Anim. Husbandry, Konkuk Univ., Seoul, S. Korea]

Chicken leg muscle was stored at 0 ± 1°C for 6 wk and analysed once/wk. Drip loss increased gradually from 1.62% initially to 6.73% at 6 wk; drip pH rose slightly (6.2-6.6); drip protein content increased gradually from 1.75% to 4.8%. Leg muscle pH rose

slightly (6.2-6.6); water holding capacity fell (62.71 to 49.54%); total extractable protein rose from 42.27 to 55-60% (actomyosin concn. rose from 20.76 to 30.0% and sarcoplasmic protein levels fell from 24.62 to 13.35%); peroxide value increased dramatically from 4.67 initially to 39.71 at 2 wk, and decreased after the 3rd wk to a final value of 11.43; thiobarbituric acid value increased from 0.089 to 0.821; total bacterial and coliform counts rose. [From En summ.] LH

## 58

**Prediction of abdominal fat in broiler chickens using wing web and humeral feather tract measurements.**  
Mirosh, L. W.; Becker, W. A.; Spencer, J. V.; Verstrate, J. A.

*Poultry Science* 60 (3) 509-512 (1981) [6 ref. En]  
[Washington State Univ., Pullman, Washington 99164, USA]

Correlation coeff. between abdominal fat and 2 skin measurements in male and female broiler chickens (*Gallus domesticus*) were not useful predictors of abdominal fat wt. or %. Skin measurements studied were wing web thicknesses measured at 49 days, and humeral feather tract pinches measured after slaughter on the 50th day, after thawing but before evisceration. JRR

## 59

**Sampling for precise microbiological plate counts of broiler chicken carcasses.**

Klinger, I.; Basker, D.; Juven, B. J.

*Poultry Science* 60 (3) 575-578 (1981) [10 ref. En]  
[Kimron Vet. Inst., Bet Dagan, Israel]

The variability of microbiological sampling of 40 dressed chicken carcasses was examined by skin tissue removal followed by Stomacher homogenization. No significant differences among mean plate counts were found among 5 different sites on the carcasses. Mean results may, therefore, be obtained with any desired precision depending on the numbers of carcasses and sites sampled. A method is presented for optimizing the economic cost of the examination at any given precision. AS

## 60

**Influence of strain, housing and season on egg quality traits in White Leghorn pullets.**

Jaya Prasad, A.; Kothandaraman, P.; Kadirvel, R.; Krishnan, A. R.

*Cheiron* 10 (2) 63-66 (1981) [13 ref. En] [Dep. of Poultry Sci., Vet. Coll., Madras-600 007, India]

Groups of (i) purebred or (ii) commercial hybrid White Leghorn pullets were reared in 5-hen cages or in a deep litter system, over the period 27-48 wk of age (Dec.-May). Egg quality was evaluated at 4-wk intervals. A table of results is given. (i) eggs were heavier, had inferior shell characteristics but higher yolk indices than (ii). Cage-reared hens laid heavier eggs with better shell characteristics and larger yolks but poorer yolk indices than floor-reared hens. Neither strain nor housing system significantly influenced albumen characteristics. Albumen index, Haugh score, yolk index and shell characteristics all deteriorated with increasing hen age. Incidence of blood spots and meat spots was highest in eggs laid by (i) and by cage-housed birds. AJDW

## 61

**Eviscerating killed poultry.**

Loth, K.; Loth, P.

*British Patent* 1 591 145 (1981) [En]

Processing apparatus is described in which broiler carcasses are clamped back downwards by the tail to position the birds for automatic removal of entrails. IFT

## 62

**[Use of pigment additives in broiler feed.] Der Einsatz von Farbstoffträgern in Hühnermastrationen.**

Lettner, F.; Stephan, K.

*Bodenkultur* 32 (1) 55-61 (1981) [10 ref. De, en] [Inst. für Tierproduktion, Univ. für Bodenkultur A-1180, Vienna, Austria]

Effect on broiler skin colour of adding the commercial pigment carrier Carophyll (Hoffmann-LaRoche) and flower carotenoids to feed was studied using 4 groups each of 100 male Hubbard hybrid chickens. Rations given contained the following pigment concn.: (i) control, no pigment addition, natural xanthophyll (XAN) content 5.4 p.p.m.; (ii) 17 p.p.m. pigment from Carophyll yellow, total XAN 18.7 p.p.m.; (iii) 35 p.p.m. carotenoids from Florafl 6.6 (from flower meal of *Tagetes erecta*) total XAN 38.6; (iv) 35 p.p.m. carotenoids from Florafl + 30 (extract of *T. erecta*). There were no significant differences between groups in wt. gain, feed conversion efficiency and mortality. Subjective classification of carcass colour showed that (ii) carcasses were highly significantly better than all other groups, and that (iii) and (iv) were highly significantly better than the control group (i). DIH

## 63

**[Determination of residual Anzar 8100 in the organs or tissues of poultry.]**

Kalburov, G.; Kerkenyakova, A.

*Nauchni Trudove, Vissch Institut po Khranitelna i Vkusova Promyshlemost* 25 (2) 295-297 (1978) [6 ref. Bg]

Leghorn hens (groups of 5) were fed a diet containing 200 p.p.m. of the herbicide Anzar 8100 (active principle disodium methylarsenate) for 30 days up to slaughter; a similar group was fed the same diet containing 2 g sunflower pectin. Considerable residues were found in the former group, the level in tissue being 0.0250 mg/kg; however, addition of pectin to the diet produced a 30-80% decline, the level in tissue being 0.0047 mg/kg. HBr

## 64

**[Effects of illumination regime on results of cage rearing of broilers.]**

Al'-Kaisi, Sh. M.

*Doklady TSKhA /Sel'skokhozyaistvennaya*

*Akademika imeni K. A. Timiryazeva* No. 250, 102-105 (1979) [4 ref. Ru] [Timiryazevskaya Sel'skokhoz. Akad., Moscow, USSR]

During Febr.-April 1978, groups of day-old Broiler-6 cross chicks were kept in 4-tier batteries of cages at 10 birds/cage of 3150 cm<sup>2</sup> floor area, 5 groups receiving resp. 12.5, 12.5, 25, 50 and 50 lux illumination during the 1st 12 days, and resp. 3, 6, 6, 6 and 12 lux illumination during the 13th-56th days. The birds were slaughtered when 56 days old, and 3 males and 3 females from each group were analysed. Proportions of 1st quality carcasses were resp. 72.2, 87.2, 94.2, 80.0 and 81.6%.

Slaughter yields were resp. 65.9, 63.2, 62.5, 64.8 and 62.5%. Edible carcass parts were resp. 82.5, 81.6, 82.7, 85.4 and 82.7%; total muscles were 68.8, 67.9, 69.3, 66.7 and 68.1%; and ratios of edible to inedible parts in cleaned carcass were 4.68, 4.48, 4.73, 5.84, and 4.72:1 resp. SKK

## 65

### Effects of dietary soybean lecithin on some sensory and rheological properties of frozen and non-frozen chicken meat.

Moraes, M. A. C.; Schneider, I. S.; Forster, R. J. *Journal of Texture Studies* 12 (1) 63-69 (1981) [18 ref. En] [Fac. de Engenharia de Alimentos-CP, 1170 UNICAMP- 13.100 Campinas-SP, Brazil]

Soybean lecithin was added to practical rations fed to 144 broiler chicks. The dark and white meats from frozen and non-frozen carcasses were submitted to both mechanical (Warner Bratzler and Instron Universal Testing Machine) and sensory assessments of tenderness. A good correlation was observed between the 2 types of measurements. Regression equations indicated that higher lecithin contents in the rations decreased sensory toughness of the white meat. Freezing of the meats at -40°C had little effect on texture. AS

## 66

### A consumer study of the eating quality of broiler chickens fed rations containing low glucosinolate rapeseed meal and rapeseed screenings meal.

Hawrysh, Z. J.; Sam, R. M.; Hardin, R. T.; Robblee, A. R. *Poultry Science* 59 (11) 2444-2448 (1980) [6 ref. En] [Foods & Nutr. Div., Fac. of Home Economics, Univ. of Alberta, Edmonton, Alberta, Canada T6G 2M8]

The eating quality of 8-wk-old White Mountain x Hubbard broiler chickens fed 4 (commercial-type) rations was evaluated by 110 consumer panelists. The rations were a soybean meal control ration (SBM), a 10% Tower rapeseed meal ration (RSM), a soybean meal ration with 10% rapeseed screenings meal, and a Tower rapeseed meal ration with 10% rapeseed screenings meal. Panelists received 4 coded frozen half-chickens (one representing each ration treatment) and were instructed how to cook each defrosted chicken half. Consumer panelists scored the odour, flavour and overall acceptability of the chickens and then ranked the chickens in order of preference. There were no significant differences in the odour, flavour, and overall acceptability of the cooked chickens attributable to ration. Mean scores given to each of the rations for preference rating of the cooked chickens show they were similar in eating quality, suggesting that the eating quality of chickens was not affected by the inclusion of 10% Tower rapeseed meal in the ration. Inclusion of 10% rapeseed screenings meal in either the SBM or RSM ration also had no effect on the eating quality of the broilers. AS

## 67

### The fate of broiler necks and giblets.

Baker, R. C.; Goodrich, D. C.

*Poultry Science* 60 (2) 332-335 (1981) [4 ref. En] [Dep. of Poultry Sci., Cornell Univ., Ithaca, New York 14853, USA]

A consumer survey was conducted at the New York State Fair to determine broiler buying practices and to find out what use was made of broiler necks and giblets. About one-half of the consumers purchasing entire broiler carcasses during the previous month bought them in cut-up form while the other half bought the whole uncut carcass. Over half bought parts; more than one-third of these consumers said they bought parts only. About one-half of the consumers who purchased cut-up or uncut carcasses stated that they either used necks and giblets as pet food or discarded them. One-half of these consumers said they were interested in purchasing broilers without necks and giblets. Of this group, more than one-third said they were willing to pay a premium. The average premium specified was 6c/lb. AS

## 68

### Effects of using mechanically deboned meat from broiler breast frames and isolated soy protein on objective and sensory characteristics of poultry rolls.

Lyon, C. E.; Lyon, B. G.; Hudspeth, J. P.

*Poultry Science* 60 (3) 584-590 (1981) [11 ref. En] [Meat Processing Res. Unit, Richard B. Russell Agric. Res. Cent., USDA, P.O. Box 5677, Athens, Georgia 30613, USA]

Six poultry rolls were prepared to evaluate effect of mechanically deboned meat (MDM) from broiler frames (ribs and back) and isolated soy protein (ISP) on quality. MDM and hand-deboned broiler breast meat

(HDBM) for each roll were mixed with appropriate emulsion bases containing 0 or 2% ISP for 5 min, stuffed into fibrous casings and cooked in a smokehouse. The following characteristics were measured: cooked yield, colour (objective, subjective), and texture (Texture Profile Analysis). Rolls containing ISP exhibited significantly higher cooked yield than rolls without ISP. Rolls containing ISP and 10 or 20% MDM exhibited higher cooked yield than rolls with ISP and 0% MDM. As level of MDM increased from 0 to 20% the rolls became darker, redder, and more yellow, as determined by objective colour measurements. Colour attributes of saturation and hue significantly decreased as MDM level increased, and total colour difference values increased as level of MDM increased. Sensory data (untrained sight panel) confirmed that rolls became significantly darker as MDM level increased. The objective and sensory textural attributes of hardness, cohesiveness, and chewiness decreased as level of MDM increased. Positive significant correlation coeff. between objective and sensory data for hardness and chewiness indicate agreement between the Instron and panel. AS

## 69

[Comparison of 'in vitro' proteolysis of beef, pork, horsemeat and poultry meat.]

Ciappellano, S.; Porrini, M.; Testolin, G.; Cantoni, C. *Industrie Alimentari* 20 (2) 101-103 (1981) [16 ref. It, en] [Cattedra di Fisiologia della Nutr. & Razionamento Fac. di Agraria, Milan, Italy]

Proteins were extracted from samples of uncooked, boiled, and roasted chicken, beef, pork and horsemeat to assess their food value after heat treatment. Enzymic action first of pepsin (3 h at pH 2) and subsequently of pancreatin (8 h at pH 8). Results (tabulated, as % amino acids liberated) showed that all the meats, except pork, were hydrolysed more when roasted than when boiled. All the meats could be satisfactorily incorporated in the diet. KME

## 70

Enzymatic tenderization of spent White Leghorn hens.

Bawa, A. S.; Orr, H. L.; Usborne, W. R.

*Poultry Science* 60 (4) 744-749 (1981) [23 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

3 trials were conducted using 54 White Leghorn spent hens, 12-14 months old. In each trial a solution of papain or bromelain at levels of 50, 75 and 100 p.p.m. on the basis of starved live wt. was injected into the vascular system 5 min. prior to slaughter. The carcasses were chilled, weighed, labelled, vacuum packaged, and held at  $0 \pm 1^\circ\text{C}$  for 1, 4, and 7 days before cooking. Results obtained indicated that storage of carcasses treated with either enzyme at increasing levels linearly increased tenderness, with papain resulting in greater tenderization than bromelain. Papain levels of 100 p.p.m. had an undesirable effect on flavour resulting in lower overall acceptability. Sensory panel score for tenderness evaluation and Warner Bratzler shear values revealed a negative correlation, with a coeff. of detn. of 0.72. The drip loss, sensory panel score for juiciness, flavour, and overall acceptability; and moisture, extractable N and nonprotein N of the cooked samples were not significantly affected by either of the treatments. AS

## 71

Sampling of broiler carcasses for *Salmonella* with low volume water rinse.

Cox, N. A.; Thomson, J. E.; Bailey, J. S.

*Poultry Science* 60 (4) 768-770 (1981) [15 ref. En] [USDA, Sci. & Education Administration, Richard B. Russell Agric. Res. Cent., Athens, Georgia 30613, USA]

The uneven distribution and low numbers of salmonellae usually present on broiler carcasses make whole carcass rinsing the most sensitive sampling procedure for detecting this organism on the raw product. However, 270 ml of water or medium has been the smallest vol. used in past published research. We found that 100 ml was adequate to recover *Salmonella typhimurium*, *S. California*, or *S. montevideo* from freshly processed broiler carcasses that had been

inoculated with the organism at the rate of 50 cells/carcass. When carcasses were inoculated with 20 cells of *S. heidelberg*, then stored at  $-23^\circ\text{C}$  for 3 or 6 months, sampling with 100 ml was adequate to detect the organism on all carcasses. The advantages of using the smallest vol. of rinsing medium that will consistently lead to detection of salmonellae present are: less enrichment medium is required, less incubator space is required, and the concn. of cells in the selective enrichment medium at the end of incubation is greater; hence, the greater are the chances of salmonellae detection when a drop is subsequently transferred to the selective plating medium. AS

## 72

The effect of age of bird and method of chilling on composition of broiler skin.

Suderman, D. R.; Cunningham, F. E.

*Poultry Science* 59 (10) 2247-2249 (1980) [14 ref. En] [Dep. of Anim. Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66506, USA]

Hubbard chicks were raised on the Kansas State University poultry farm and processed at 3, 5, 7, or 9 wk of age. Half of the birds in each age group were chilled 24 h in slush ice, and the other half were hot packed. Immediately after processing, skin was removed from the legs and the composite sample analysed for moisture, protein, fat, ash, and elemental composition. Moisture in broiler skin decreased with age of the bird, while fat content increased. Nonchilled skin also had a higher moisture and ash content than chilled skin. The % protein remained rather constant as the birds increased in age. Ca, K, and S contents were not affected by age or chill method, but nonchilled skin had higher Mg and Na levels. The 3-wk-old broilers had significantly greater P levels than broilers of other ages. AS

## 73

Performance and carcass composition of male broilers as influenced by phase feeding.

Holsheimer, J. P.

*Poultry Science* 59 (9) 2060-2064 (1980) [9 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA, Beekbergen, Netherlands]

Diets containing 1.22 and 1.03% lysine were fed to male broiler chicks from 0 to 2 wk of age. To each of these groups diets containing 1.22, 1.03 and 0.86% lysine were fed from 2 to 4 wk of age. From 4 to 8 wk of age chicks from the 6 prior treatments were fed diets containing 1.22, 1.03, 0.86 and 0.74% lysine, thus making possible the evaluation of potentially reduced requirements as well as compensatory growth. The diets given from 0 to 4 wk of age had only a slight effect on the carcass composition of 8 wk old male broilers. Irrespective of diet from 0 to 4 wk, the diets given from 4 to 8 wk had a pronounced effect on the carcass composition. Decreasing the dietary lysine content resulted in a significant decrease in carcass protein content and a significant increase in carcass fat content. JRR

74

**Lactose preenrichment versus direct enrichment for recovering *Salmonella* from deep-chilled broilers and frozen meat products.**

Cox, N. A.; Bailey, J. S.; Thomson, J. E.; Carson, M. O. *Poultry Science* 59 (11) 2431-2436 (1980) [17 ref. En] [USDA, Sci. & Education Administration, Richard B. Russell Agric. Res. Cent, Athens, Georgia 30604, USA]

Each of 160 processed broiler carcass halves was inoculated with 30 cells of one of the following marker organisms which were *Salmonella* serotypes: *S. California*, *S. montevideo*, *S. senftenberg*, and *S. typhimurium*. The carcasses were individually bagged, placed in a blast freezer (-40°C) until the internal breast temp. reached -2°C, and stored at -2°C for 30 days. Carcass-halves were then sampled by either a preenrichment procedure (lactose broth) or by a shorter direct enrichment (selenite cystine broth) procedure. The marker organisms were detected on 73 of 79 inoculated carcass-halves when preenrichment was used, and on 79 of 80 when sampling was by direct enrichment. Recoveries were also good when whole carcasses inoculated with either 20 cells of *S. heidelberg* or *S. senftenberg* were stored for 3 and 6 months at -23°C. 20 cells of *S. heidelberg* or *S. senftenberg* were frozen at -23°C for 2 and 4 wk in tubes of phosphate buffer or 1% sodium citrate. *S. heidelberg* was recovered from 27 of 40 phosphate samples and 2 of 40 sodium citrate samples. *S. senftenberg* was not recovered from any of the 80 tubes inoculated. When 20 cells of *S. heidelberg* or *S. senftenberg* were inoculated into 2 nonselective growth media (nutrient broth and 1% peptone broth) then frozen for 2 and 4 wk at -23°C, *S. senftenberg* was not recovered from any of the 80 tubes, whereas *S. heidelberg* was recovered from 5 of 40 nutrient broth tubes and 6 of 40 peptone tubes. 60 samples (20 g each) of comminuted chicken, of ground beef, and of pork sausage (total of 60 samples) were also inoculated with 20 cells of either *S. heidelberg* or *S. senftenberg*, then held for 2 and 4 wk at -23°C. The marker organisms were recovered from all samples by both preenrichment and direct enrichment procedures. The simpler direct enrichment procedure was therefore adequate for detecting low levels of salmonellae and required 24 h less assay time than the preenrichment procedure. AS

75

**Performance and meat quality of White Leghorn male chicks on different dietary treatments.**

Sheriff, F. R.; Vedhanayagam, K.; Kothandaraman, P.; Venkataramanujam, V.; Sundaresan, K. *Cheiron* 10 (1) 24-31 (1981) [17 ref. En] [Dep. of Poultry Sci, Madras Vet. Coll, Madras-7, India]

400 'Forsgate' strain White Leghorn male chicks, 1 day of age at the start of the trial, received diets with (i) 23% protein, 2600 kcal/kg; (ii) 23% protein, 2800 kcal/kg; (iii) 27% protein, 2600 kcal/kg; or (iv) 27% protein, 2800 kcal/kg, up to slaughter at 8 or 10 wk of age. Data are presented for ready-to-cook yield, giblet yield, edible yield, and moisture, protein and ether extract contents. Ready-to-cook yield did not differ

significantly between treatments or ages. Giblets of group (ii) were heavier than those of (i), (iii) or (iv). Giblet % at 10 wk was lower than at 8 wk of age. 23% protein diets gave lower edible yield than 27% protein diets; edible yield was higher after 10 than after 8 wk. There was a tendency for protein content of the carcass to increase and for ether extract content of the carcass to decrease with increasing dietary protein concn. AJDW

76

**Amino acid composition of breast and thigh meat from broilers produced in four locations of the United States.**

Hamm, D.

*Journal of Food Science* 46 (4) 1122-1124 (1981) [16 ref. En] [USDA-SEA-AR, Richard B. Russell Agric. Res. Cent, Athens, Georgia 30613, USA]

Broiler breast and thigh meat samples from birds grown and processed in 4 locations of the US were analysed for amino acid composition. On a % protein basis amounts of valine, leucine, isoleucine, and histidine were significantly greater ( $P \leq 0.01$ ) in breast meat and glycine, hydroxyproline, hydroxylysine, threonine, and serine were greater in thigh meat. Area of production and/or related management practices appeared to influence the concn. of about half the amino acids. Meat from male broilers had more hydroxyproline than did meat from females. IFT

77

**Fast cleanup of difficult substrates for determination of fenitrothion and some derivatives.**

Hache, P.; Marquette, R.; Volpe, G.; Mallet, V. N.

*Journal of the Association of Official Analytical Chemists* 64 (6) 1470-1473 (1981) [9 ref. En] [Chem. Dep., Univ. de Moncton, Moncton, New Brunswick, Canada E1A 3E9]

A simple method is described for fast recovery of fenitrothion, an organophosphorus insecticide, from soil, chicken liver, urine, clams, and pine needles. The substrate is homogenized with acetonitrile or methanol, diluted with water, and passed through a column containing Amberlite XAD-7. Fenitrothion is recovered quantitatively by eluting with 4 portions of 25 ml ethyl acetate. After evaporation, the compound is determined quantitatively by GLC with a flame photometric

detector. The procedure is also suitable for some derivatives of fenitrothion, namely, fenitrooxon and S-methyl-fenitrothion. As low as 0.05 p.p.m. of the parent compound may be determined. AS

78

**The occurrence of *Campylobacter jejuni* in fresh food and survival under different conditions.**

Svedhem, A.; Kaijser, B.; Sjögren, E.

*Journal of Hygiene* 87 (3) 421-425 (1981) [13 ref. En] [Dep. of Clinical Bacteriology, Inst. of Med. Microbiol., Univ. of Göteborg, Göteborg, Sweden]

Studies were conducted on occurrence of *Campylobacter jejuni* in commercial samples of fresh and frozen chicken, minced beef, minced pork and

minced beef + pork. *C. jejuni* was detected in 6 of 10 frozen chickens, 5 of 8 fresh chickens, and 6 of 7 chickens frozen stored for 3 months; it was detected in all 9 samples of minced beef, pork or beef + pork studied. Storage at 4°C for  $\geq 7$  days did not alter the count of *C. jejuni*; storage at 42°C resulted in a rapid increase for the first day, followed by a rapid decrease, no *C. jejuni* being detectable after 2 days. *C. jejuni* counts also decreased rapidly at 20°C, and could not be detected after 3 days. None of 13 *C. jejuni* strains survived for  $> 15$  min at 60°C. Survival of *C. jejuni* was similar in fresh chicken, frozen chicken and the minced meats studied. AJDW

## 79

[Factors affecting the meat quality of broilers.]

Einflussfaktoren auf die Fleischbeschaffenheit bei Broilern.

Ristic, M.

*Fleischwirtschaft* 61 (10) 1522, 1525-1526, 1528, 1530-1531; 1553 (1981) [many ref. De, en] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

Broilers were slaughtered at 5, 6, 7 and 8 wk and the factors affecting meat quality were investigated. The results, shown in tables, were as follows: slaughter yields rose and the % wt. of offals fell with increasing fattening period; the % lean meat and % bone in the breast and thigh were best after 7 wk fattening (62.09 and 60.58 % lean meat resp.); the meat:bone ratio improved with increasing fattening; highest sensory scores and smallest grilling losses in both breast and thigh meat were achieved after 8 wk; objective tenderness was best after 5-6 wk in breast, 6 wk in thigh meat; pH<sub>1</sub> (immediately after slaughter) ranged from 5.40 to 6.90, with 5.6% at pH<sub>1</sub>, < 5.7, 9.3% at pH<sub>1</sub>, 5.7-5.8, 65.4% at pH<sub>1</sub>, 5.8-6.3, 19.7% at pH<sub>1</sub>, > 6.3; mean pH<sub>1</sub> was 6.06 (all carcasses), 6.02 (male carcasses), 6.10 (female carcasses); normal meat quality was found in 74.7% of carcasses. 69.3% of carcasses were assigned grade A, 26.1% grade B and 4.6% grade C; up to 15.3% grade A and 14.4% grade B carcasses had pH<sub>1</sub>, < 5.8. RM

## 80

[Serological differentiation of egg yolk, egg white, muscle and blood serum of the chicken.] Serologische Differenzierung von Eigelb, Eiklar, Muskulatur und Blutserum vom Huhn.

Manz, J.

*Fleischwirtschaft* 61 (10) 1580-1581 (1981) [3 ref. De, en] [Landesuntersuchungsamt für das Gesundheitswesen Nordbayern, Henkestrasse 9-11, D-8520 Erlangen, Federal Republic of Germany]

Regulations and their general interpretation by the trade, food scientists and inspectors, consumers, etc., sometimes require data on the use of egg products and poultry meat in meat products. The present paper shows that serological differentiation of egg yolk, egg

white, muscle and blood serum of the chicken (*Gallus gallus*) is possible. Antisera to egg yolk, egg white, muscle and blood serum of the chicken were used. In the immunoelectrophoretogram the specific protein component for egg white lay within the albumin range and that for egg yolk within the  $\alpha_2$ -globulin range. In the range of the globulins the blood serum contained fractions which were not found in the egg white, egg yolk or muscle. When mixed with egg yolk, muscle extracts could only be detected after the elimination of the egg yolk. AS

## 81

The effectiveness of potassium sorbate as a microbial inhibitor on fresh, refrigerated poultry.

Cunningham, F. E.

*Feedstuffs* 54 (4) 20, 31, 33-34 (1982) [18 ref. En] [Dep. of Anim. Sci., Kansas State Univ., Manhattan, Kansas 66506, USA]

Use of potassium sorbate as a preservative on fresh refrigerated poultry is reviewed. Literature data are presented showing effects of sorbate dips (at various concn.) on spoilage bacteria and pathogens in cold-stored chicken, and effects on the organoleptic properties of the product. The results show sorbate to inhibit the spoilage microflora, control salmonellae and extend shelf-life of chickens. No effect on organoleptic properties is reported. Potassium sorbate is classified as 'Generally Recognised as Safe' in the USA; residues in treated poultry are low. AJDW

## 82

[Changes in the lipid fraction and fatty acid compositions of chicken.]

Petchenko, V. I.; Ratushnyi, A. S.; Koz'mina, E. P.

*Izvestiya Vysshikh Uchebnykh Zavedenii, Pishchevaya Tekhnologiya* No. 2, 18-22 (1981) [10 ref. Ru] [Moskovskii Ordena Trudovogo Krasnogo Znameni Inst. Narodnogo Khozyaistva im. G. V. Plekhanova, Kiev, USSR]

Changes in the lipid fraction composition of chicken and the fatty acid composition of the lipids during cooking were investigated; data are presented. Hydrolysis of phospholipids in muscle tissue and triglycerides in skin occurs. Appreciable changes in the fatty acid composition of muscle lipids may occur. Use of chicken as a raw material in meat processing is recommended, because of the relative stability of its lipid composition during freezing and cooking. STI

## 83

Intrinsic labelling of chicken meat with stable isotopes of zinc, for intended use in human feeding studies: feasibility and design considerations.

Janghorbani, M.; Ting, B. T. G.; Young, V. R.; Steinke, F. H.

*British Journal of Nutrition* 46 (3) 395-402 (1981) [12 ref. En] [Nuclear Reactor Lab., Massachusetts Inst. of Tech., Cambridge, Massachusetts 02139, USA]

## 84

**Polybrominated biphenyl isomer distribution in raw and cooked chicken and chicken broth.**

Zabik, M. E.; Smith, S. K.; Cala, R.

*Poultry Science* 58 (6) 1435-1438 (1979) [8 ref. En]  
[Dep. of Food Sci. & Human Nutr., Michigan State Univ., E. Lansing, Michigan 48824, USA]

Studies were conducted on the distribution of 7 polybrominated biphenyl (PBB) residues in tissues of White Leghorn hens fed the fire retardant preparation Firemaster FF-1 at levels of 30, 45, 60 or 90 p.p.m. in the diet. Tables of data are given for % distribution of the 7 isomers in breast, drumstick and thigh meat and thigh skin, PBB concn. in raw meat, pressure-cooked meat and meat broth, and effects of dietary PBB level on the % distribution of the 7 isomers. Significant differences between tissue sites were observed for distribution of 6 of the 7 isomers. Cooking significantly influenced % distribution of 3 isomers. Level of PBB in the diet significantly influenced distribution of 3 isomers; level of the major fraction, 2,2',4,4',5,5'-hexabromobiphenyl was highest for the lowest dietary PBB concn., whereas concn. of heptabromobiphenyl was greatest for the highest dietary PBB concn. Interactions between the variables studied are also considered. AJDW

## 85

[Studies of flavouring substances. III. Enzymic hydrolysis of chicken meat and flavour of the hydrolysates.]

Ishida, K.; Yamamoto, A.

*Journal of Japanese Society of Food Science and Technology* [Nippon Shokuhin Kogyo Gakkaishi] 24 (4) 171-178 (1977) [16 ref. Ja, en] [Tokyo Res. Lab., Kyowa Hakko Kogyo Co. Ltd., Machida-shi, Tokyo, Japan]

Hydrolysis of chicken meat by protease preparations having a strong endopeptidase activity resulted in a high yield of bitter-tasting hydrolysates, while protease preparations possessing both endopeptidase and exopeptidase activity produced hydrolysates with an acceptable taste. A low yield of bitter-tasting hydrolysates was obtained from meat which had been heated for 15 min at 95°C prior to hydrolysis. Hydrolysates of the sarcoplasmic protein fraction had a palatable taste, while those of the myofibrillar protein fraction had an extremely bitter taste. [From En summ.] JA

## 86

**Genetic effects influencing dressing percentage and yield of commercial cut up parts estimated from diallel mating system in broilers.**

Ulaganathan, V.; Kosalaraman, V. R.; Ranga Reddy, P. *Cheiron* 9 (4) 222-230 (1980) [10 ref. En] [Poultry Res. Sta., Nandanam, Madras 600 035, India]

A diallel cross was conducted over a 2-yr period among 5 strains of broilers, i.e. 1c<sub>1</sub> and 1c<sub>2</sub> of White Cornish, 1c<sub>3</sub> of Red Cornish, 1H<sub>1</sub> of New Hampshire and 1R<sub>1</sub> of White Rock. The magnitude of genetic variation was estimated for dressing %, breast, legs, back + neck, and wings in males and females. Tables of results are given. Non-additive genetic action might be relatively more important than additive genetic action for meaty parts of the carcass. LH

## 87

**Comparison of sample storage methods for vitamin B<sub>6</sub> assay in broiler meat.**

Ang, C. Y. W.

*Journal of Food Science* 47 (1) 336-337 (1982) [En]  
[USDA, ARS, Richard B. Russell Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

5 methods were compared for storage stability of vitamin B<sub>6</sub> in broiler meat samples. Max. retention of vitamin B<sub>6</sub> was observed in the N<sub>2</sub>-packed freeze-dried samples at -34°C (101-103% up to 20 months). Good retentions occurred in the intact tissues of half birds at -34°C (90% in 16 months), and in ground meat samples (200 g portions) at -34°C (91% up to 12 months). Significantly lower retentions were found in freeze-dried samples stored at room temp. (85-77% in 1-5 months, resp.) and for ground meat small portion samples (5 g) at -34°C (84-72% in 3-5 months, resp.). IFT

## 88

[Separation of meat from broiler carcasses.]

Präparation des Fleischanteiles von Hähnchen.  
Woltersdorf, W.

*Fleischwirtschaft* 61 (9) 1274-1275 (1981) [De]  
[Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

A method for separation of broiler meat from bone requiring < 15 min and allowing detn. of drip loss of frozen carcasses is shown with the aid of photographs. RM

## 89

**Prediction of growth rate in chickens based on body measurements.**

Kanoun, A. H.

*Dissertation Abstracts International*, B 42 (3) 843-844: Order no. 8119710, 127pp. (1981) [En] [Colorado State Univ., Fort Collins, Colorado 80521, USA]

2 strains of broiler chicken (WL and VC) differing in body conformation and coeff. of inbreeding were used to determine the relationship of egg wt, body wt and shank length to live wt and muscle wt at broiler age and to study the relationship among all variables. WL, characterized by larger skeleton and angular body shape, is a dominant white strain developed from an Original Cornish line of Vantrees Breeding stock. VC, characterized by heavy flesh, has approx. 25% of its inheritance from White Plymouth Rock and 75% from Cornish. Results of 2 studies conducted at an interval of 2.5 yr included the following. Body wt was found to be the simplest and most accurate parameter for use as a criterion for growth selection from the age of 5 wk. Selection of birds with greater live shank length at 5 wk and/or 54 days of age was found to increase the amount of breast meat in female broilers. There was an indication of a weak but statistically significant association between changes in muscle wt and % water, fat, protein and ash in muscle. JA

## 90

**Studies on the interaction between shortening and product during the deep-fat frying of chicken parts.**  
Waimaleongora-Ek, C.

*Dissertation Abstracts International, B* 42 (3) 956-957: Order no. 8119217, 126pp. (1981) [En] [Mississippi State Univ., State College, Mississippi, 39762, USA]

Shortening discarded from chicken-frying establishments was lower in peroxide values, epoxide readings and carbonyl contents and lighter in colour than shortening discarded from fast-food restaurants serving other products, e.g. hamburgers. Peroxide and 2-thiobarbituric acid values of fresh shortening increased rapidly during the first few days of chicken frying and then stabilized. Continuous increases were observed in free fatty acid, epoxide and dielectric constant readings, unsaturated carbonyls and Hunter 'a' values; no distinct change in viscosity was observed and Hunter 'L' and 'b' values decreased. Shortening colour was found to have a direct effect on the colour of fried chicken. Chicken fried in shortening having a high carbonyl content had a high carbonyl content in the skin and coating batter but no effect was detected in the meat. Further studies examined the  $H_2S$ , carbonyl,  $CH_3SH$  and free  $NH_3$  contents of shortening and of chicken after frying, holding and reheating. Volatile components in the shortening were examined by head-space gas chromatography. As shortening temp. increased the number and quantity of volatile components increased. JA

## 91

**A comparison of the water holding capacity of pre- and post-rigor chicken, trout and lobster muscle in the presence of polyphosphates and divalent cations.**  
Regenstein, J. M.; Stamm, J. R.

*Journal of Food Biochemistry* 3 (4) 223-228 (1980) [7 ref. En] [Dep. of Poultry Sci., Inst. of Food Sci., Cornell Univ., Ithaca, New York 14853, USA]

The water holding capacity (WHC) of rainbow trout (*Salmo gairdneri*) white muscle and lobster (*Homarus americanus*) tail muscle did not change from pre- to post-rigor. The trout muscle WHC values were similar to those of post-rigor chicken breast muscle and were not affected by addition of sodium pyrophosphate (PP), Mg, Ca or combinations of these. In contrast, the WHC of lobster muscle was like the WHC of pre-rigor chicken breast muscle. The pre-rigor lobster muscle showed a large increase in WHC values with the addition of PP, (205% of control) but with the further addition of Mg to the sample the increase was depressed (166% of control). Ca addition to the PP, sample even more markedly depressed the WHC (90% of control). In both cases, Mg and Ca seemed to have approximately the same effect on WHC whether PP was present or not. Kena (a commercial polyphosphate) on the other hand, increased the WHC of both pre- and post-rigor trout and lobster muscle. Ca seemed to negate the increasing effect Kena had on WHC. Kena plus Mg caused a large increase in the WHC of the pre-rigor lobster muscle; the WHC capacity with Kena alone was 123% of control while the WHC with Kena and Mg was 231% of control. AS

## 92

**Factors affecting the sodium chloride extractability of muscle proteins from chicken breast, trout white and lobster tail muscles.**

Regenstein, J. M.; Stamm, J. R.

*Journal of Food Biochemistry* 3 (4) 191-204 (1980) [34 ref. En] [Dep. of Poultry Sci., Inst. of Food Sci., Cornell Univ., Ithaca, New York 14853, USA]

Amount of protein extracted from chicken breast muscle at low salt (0-50mM NaCl) increased as salt concn. of the extracting solutions increased. Addition of 10mM sodium phosphate buffer pH 7 (P<sub>i</sub>) caused a marked increase in protein extractability at all salt concn. A particular polypeptide chain of about 150 000 Da appeared to be particularly sensitive to the extraction conditions. At high salt (0.6M NaCl, 50mM P<sub>i</sub> buffer pH 7.0) a second extraction still contained significant amounts of protein. The amount of protein extracted was maximized at a 1/20 dilution. On the other hand the protein extractability of trout white muscle showed a smaller P<sub>i</sub> effect and very little dependence on low salt concn. The protein extractability of lobster flexor muscle showed little change with either increased salt or P<sub>i</sub>. For all muscles extraction over time with either high or low salt remained essentially constant after the first day with the most protein being extracted from lobster muscle and the least from chicken muscle. AS

## 93

[Proceedings of the 33rd National Conference.]  
[Conference proceedings]

Italy, Societa Italiana delle Scienze Veterinarie

*Atti della Societa Italiana delle Scienze Veterinarie* 33, 298pp. (1979) [It]

The text is given of papers presented at this symposium, held in Urbino on 6-9 Sept. 1979, including the following. Fibre types in muscles of marine, freshwater and brackish water fish, by E. Carpene & A. Vegetti (p. 139). Trimming of Parma ham, by C. Tarocco (p. 203). pH variations in bovine and water buffalo carcasses during ageing, by A. Borghese, A. Romita & A. di Giacomo (p. 209). Use of animal and vegetable fats in broiler diets. II. Effect on carcass characteristics, by A. Bigoli, C. Corino, V. Dell'Orto, P. Ottavia (p. 219). Substances with mutagenic activity in foods of animal origin, by A. Vizzani, E. di Antonio, S. Dominici & P. Avellini (p. 259, 3 ref.). Toxicity and mutagenicity of marking ink used in slaughterhouses, by S. Dominici, A. Vizzani & E. di Antonio (p. 260, 2 ref.). F in sea-foods, by G. Persiani (p. 261). Cysticercosis in bovine carcasses in the Padua public slaughterhouse, by S. Villani (p. 262, 1 ref.). Algal toxins. I. Presence of water-soluble toxin in imported mussels (*Mytilus galloprovincialis*), by F. Gramenzi, S. Calvarese, E. D'Antonio (p. 265, 4 ref.). Isolation of enteropathogenic strains of *Escherichia coli* in bacteriological examination of meats, by T. Corsalini & G. Goffredo (p. 293). AJDW

94

**Deboning method and apparatus.**

Prince, J. A.; Abernathy, L. W.; Taylor, L. J. (Jack Prince Inc.)

**United States Patent 4 303 206 (1981) [En]**

Deboning apparatus is of the sort which operates an auger means to separate bone and similar hard material from the meat of chickens, fish or other animals. The ground meat and bone product is ingested or introduced above and flows by the auger to a meat exit below and then to a bone exit below the meat exit. Apparatus components include a particular arrangement and a compression for adjusting internal pressure, as well as a screen for separation of the bone and meat. AS

95

**The effect of wide fluctuations in temperature on food-poisoning organisms and the natural microbial flora in frozen beef and chicken substrates.**

Hall, L. P.; Slade, P. J.

**Technical Memorandum, Campden Food Preservation Research Association** No. 240, 33pp. (1980) [many ref. En]

A literature survey of work related to this study is included. Slurries of raw beef and chicken were prepared, inoculated with cultures of *Staphylococcus aureus* and *Clostridium perfringens*, frozen and stored. Thawing and refreezing tests carried out on samples after various periods of storage showed that in beef, although its lag phase of growth increased with storage time, *S. aureus* reached toxic levels when samples were thawed for 24 h. In chicken growth was slower and a toxic level was not reached. Most counts of *S. aureus* in thawed samples were lower than those from the same samples after refreezing, and the latter is thought to be a truer estimate of numbers attained during thawing. *C. perfringens* failed to reach a toxic level in either substrate during thawing, although all spores germinated. Work is continuing on the stored samples, and on a new method of enumerating salmonellae from mixed culture. On completion of the latter, substrates will be inoculated with *Salmonella* serotypes for thawing and refreezing tests. AS

96

**[Use of a vacuum packaging system for freezing and storage of broilers.]**

Vega M., J. A. de la

**Alimentos** 4 (1) 13, 15-17 (1979) [7 ref. Es, en] [Inst. Tecnologico de la Carne, Univ. Austral, Valdivia, Chile]

144 broiler carcasses were used in a comparative study on vacuum packaging of broilers in (i) Cryovac PVDC film bags or packaging in polyethylene film bags (ii) 0.04, (iii) 0.06 or (iv) 0.08 cm thick. The broilers were frozen in a tunnel freezer at temp. decreasing to -30°C, then stored at -18°C. Data are presented for freezer capacity, wt. loss during freezing and storage, wt. and juice loss during thawing, moisture contents, I values, and organoleptic properties. Freezing was more rapid in (i), giving a potential increase in freezer throughput.

Wt. loss during freezing and storage was much lower in (i) than in (ii)-(iv); (i) and (iv) gave the lowest losses during thawing. (i) gave the best moisture retention and lowest I value. Appearance and juiciness were best for samples packaged in (i); flavour was best for those packaged in (iv). AJDW

97

**The influence of dietary selenium on tissue and egg selenium levels in growing and laying chickens. (In 'Mineral elements '80. Proceedings Part II' [See FSTA (1982) 14 7A535]) [Lecture]**

Moksnes, K.; Norheim, G.

pp. 415-422 (1981) [10 ref. En] [Nat. Vet. Inst., PO Box 8156 Dep., Oslo 1, Norway]

In 1 part of this study 1-day old Norwegian-bred broilers were divided into 3 groups of 26 birds each and 5/group were killed and analysed initially, the remainder being fed a basal diet + 0.0, 0.1 and 1.0 p.p.m. Se as Na<sub>2</sub>SeO<sub>3</sub>, for 2, 4 or 6 wk. In the 2nd part, 20-wk old Norwegian-bred White Leghorn chickens (3 groups of 16) were killed initially (3/group), or fed a basal diet + 0.0, 0.1 and 1.0 p.p.m. Se as Na<sub>2</sub>SeO<sub>3</sub> for 18 or 31 wk; every 4th wk 10 eggs/group were analysed. In both studies breast and liver samples were stored at -20°C up to analysis, and tissue and egg samples were analysed by a modified fluorometric technique. Results are presented in graphs. Increased dietary levels of Se led to higher Se concn. in eggs and tissues, most significantly so with 1.0 p.p.m. supplemental Se, and especially in eggs and liver. LH

98

**On the effect of selenium added to the feed for ruminants and chicks as well as toxicological aspects on selenium injections to ruminants. (In 'Mineral elements '80. Proceedings Part II' [See FSTA (1982) 14 7A535]) [Lecture]**

Westermarck, H.; Raunu, P.; Lappalainen, L.

pp. 573-587 (1981) [5 ref. En] [Coll. of Vet. Med., Dep. of Pharmacology &amp; Toxicology, Helsinki, Finland]

Se was determined in blood and organs of normal cattle, goats, sheep and hens. Se supplementation was subsequently carried out, using Na<sub>2</sub>SeO<sub>3</sub> in drinking water, food or in intramuscular injections; in some cases Se + vitamin E was used. Se was analysed in the blood, plasma, milk, liver, muscles and kidneys, by a fluorometric technique. Results are tabulated. Se deficiency was treated efficiently by feed supplementation or injection methods, and Se residues in tissues and milk decreased more slowly than expected. It was thought younger animals may retain such residues for longer. LH

## 99

**The partial substitution of synthetic lysine for natural lysine in broiler diets.**

Al-Zubaidy, S. S.

*Dissertation Abstracts International, B* 42 (5) 1681: Order no. 8121707, 149pp. (1981) [En] [N. Carolina State Univ., Raleigh, N. Carolina, USA]

The effect of substituting synthetic lysine (SL) for natural lysine (NL) in diets (formulated to contain 1.00, 1.08, 1.16, 1.24, 1.32 and 1.40% lysine) of broiler chicks was studied. In the SL diets, L-lysine was added in increments of 0.08% to the 1.00% NL diet. Part of the trial investigated carcass composition. There was a smaller accumulation of carcass fat with each increase in dietary lysine regardless of source. Carcass composition data showed a curvilinear response for % protein, moisture and fat in male birds fed SL while a linear response was obtained in chicks fed NL; in female birds there was no consistent trend in all criteria. AL

210

## 100

**Influence of low glucosinolate rapeseed meal and rapeseed screenings meal on the eating quality of broiler chickens.**

Hawrysh, Z. J.; Sam, R. M.; Robblee, A. R.; Hardin, R. T. *Poultry Science* 59 (11) 2437-2443 (1980) [10 ref. En] [Foods & Nutr. Div., Fac. of Home Economics, Univ. of Alberta, Edmonton, Alberta, Canada T6G 2M8]

White Mountain x Hubbard broilers were fed (i) a soybean meal control ration, (ii) a 10% Tower rapeseed meal ration, and (iii), (iv) and (v), Tower rapeseed rations with 2.5%, 5% and 10% rapeseed screenings meal, resp. The broilers were slaughtered at 8 wk of age, eviscerated and frozen. Cooked light and dark meat and broths were evaluated objectively and by a trained panel. (ii) did not impair organoleptic properties of the meat. Organoleptic properties were generally similar for (ii) and for (iii)-(v). The 'other' odour score was significantly lower for (v) than for (ii) dark meat. (v) dark meat was rated 'slightly undesirable', and differed from (i) dark meat. No feed-related differences in tenderness and juiciness of light meat were observed. The results show that (v) slightly impaired organoleptic properties; (ii) did not adversely affect palatability as compared to (i). AJDW

## 101

**Abdominal and carcass fat in five broiler strains.**

Becker, W. A.; Spencer, J. V.; Mirosh, L. W.; Verstrate, J. A.

*Poultry Science* 60 (4) 693-697 (1981) [8 ref. En] [Dep. of Anim. Sci., Dep. of Food Sci. & Tech., Washington State Univ., Pullman, Washington 99164, USA]

10 males and 10 females from each of 5 commercial broiler strains were weighed and slaughtered at 55 days of age. Overall, mean live body wt. was 2112 g for males and 1702 g for females and abdominal fat was 2.9% (males) and 3.3% (females). Mean total fat in whole bird was 13.4% (males) and 15.1% (females). There were no statistically significant differences between strains at the

5% level. Correlation coeff. with % abdominal fat were 0.29 for body wt. (males) and 0.36 (females), for % carcass fat 0.51 (males) and 0.77 (females), and for fat free carcass 0.26 (males) and 0.07 (females). Abdominal fat represented 22% of the total fat for males and females. The results obtained were similar to those found previously in this laboratory with one strain of broilers. AS

## 102

**Microbiology of meats in a hypobaric environment.**

Restaino, L.; Hill, W. M.

*Journal of Food Protection* 44 (7) 535-538 (1981) [9 ref. En] [Armour Res. Cent., 15101, N. Scottsdale Road, Scottsdale, Arizona 85260, USA]

Total bacteria on surfaces of broiler chickens, pork loins and processed hams were determined during storage in a Grumman hypobaric trailer that maintained an environment of 28-31.5°F, 85-95% RH and a pressure of 5-20 mm Hg. For broiler chickens there was a lag period of 18 days before bacterial proliferation, vs. 7 days for conventional ice-pack boxes. Time required to reach levels of  $10^6$  bacteria/in<sup>2</sup> was 26 days for hypobaric storage vs. 18 days in ice-pack. Proliferation of bacteria in pork loins was studied by fabricating pork chops from loins held in hypobaric or conventional cold (32-33°F) storage for up to 25 days. For chops to have initial surface counts  $< 10^5$ /in<sup>2</sup>, loins could be held in hypobaric storage for up to 16 days, or for up to 1 wk in cold storage. Bone-in processed hams showed substantially reduced rate of bacterial growth in hypobaric storage. Predominant microorganism isolated from hams was *Streptococcus* sp.; *Pseudomonas* spp. predominated on fresh meats in hypobaric storage. DIH

## 103

**Measuring the water holding capacity of natural actomyosin from chicken breast muscle in the presence of pyrophosphate and divalent cations.**

Regenstein, J. M.; Gorimar, T. S.; Sherbon, J. W.

*Journal of Food Biochemistry* 3 (4) 205-211 (1980) [20 ref. En] [Dep. of Poultry Sci., Inst. of Food Sci., Cornell Univ., Ithaca, New York 14853, USA]

The water holding capacity (WHC) of natural actomyosin (NAM) extracted at pH 9.2 in 0.6M KCl was measured in the presence and absence of various combinations of sodium pyrophosphate (PP<sub>i</sub>), MgCl<sub>2</sub> and CaCl<sub>2</sub> using a modification of the classical centrifugation technique. Samples, in the presence of 0.15M NaCl and 20mM sodium phosphate buffer pH 6, were spun at 30 900  $\times$  gn (as measured at the bottom of the centrifuge tube) for 15 min at 2-4°C. Between 17 and 20 g water/g protein were bound over a wide range of NAM concn. In each case the amount of water held by the experimental sample was equal to or less than the amount held by a control run at the same time: 5mM PP<sub>i</sub> = 100%; 5mM PP<sub>i</sub> + 5mM MgCl<sub>2</sub> = 58%; 5mM MgCl<sub>2</sub> = 85%; 5mM PP<sub>i</sub> + 5mM CaCl<sub>2</sub> = 68%; and 5mM CaCl<sub>2</sub> = 92% of the control. Thus polyphosphate addition in the presence of divalent cations lowered the WHC of NAM. The absence of the organized structure of muscle in NAM is postulated to be the reason that polyphosphate plus divalent cation reduced WHC in these samples. A series of preliminary experiments were run in order to determine the effect of experimental parameters on WHC. AS

## 104

The effect of sodium polyphosphates and of divalent cations on the water holding capacity of pre- and post-rigor chicken breast muscle.

Regenstein, J. M.; Stamm, J. R.

*Journal of Food Biochemistry* 3 (4) 213-221 (1980)

[3 ref. En] [Dep. of Poultry Sci., Inst. of Food Sci., Cornell Univ., Ithaca, New York 14853, USA]

The water holding capacity (WHC) of natural actomyosin (NAM) of both contracted and uncontracted glycerinated myofibrils and of pre- and post-rigor chicken meat was investigated in the presence and/or absence of sodium pyrophosphate (PP<sub>i</sub>), Kena (a commercial polyphosphate), CaCl<sub>2</sub> and MgCl<sub>2</sub>. In these experiments PP<sub>i</sub> caused a small decrease in the WHC of NAM which was further decreased either by Ca or even further by Mg. PP<sub>i</sub> with or without Ca or Mg had almost no effect on the WHC of glycerinated myofibrils. Pre-rigor meat showed a slight decrease in WHC of PP<sub>i</sub> which was further decreased with Mg, and even further by Ca. With post-rigor meat the WHC increase with PP<sub>i</sub> was decreased by the addition of Mg, and even further decreased by the addition of Ca. The actual WHC of pre-rigor meat was almost twice that of post-rigor meat. Once rigor had occurred no major changes in WHC were observed up to 5 days. Kena caused a slight decrease in the WHC of NAM. Using myofibrils and the meat samples. Kena gave an increase in WHC. Addition of Ca and Mg again tended to decrease this WHC. AS

## 105

Effect of chlorinating chill water on broiler neck shelf-life.

Lillard, H. S.; Blankenship, L. C.

*Journal of Food Safety* 3 (1) 49-56 (1980) [8 ref. En]

[Richard B. Russell Agric. Res. Cent., USDA, PO Box 5677, Athens, Georgia 30613, USA]

The feasibility of improving broiler neck shelf-life by chlorinating chill water with sodium hypochlorite at 65 and 190 p.p.m. residual chlorine was investigated. An initial reduction in bacterial counts was obtained with both concn., but a residual effect on counts was obtained only with 190 p.p.m. chlorine during 20 days of storage at 2°C ± 1. This additional count reduction was somewhat off-set by a residual chlorine odour in the product. Because of the high level of organic matter found in giblet and neck, flume and chill water, coupled with little or no improvement in shelf-life of necks chilled in water containing 65 p.p.m. residual chlorine, it was concluded that the use of ≤ 50 p.p.m. chlorine in chiller input water, as recommended by FDA would not result in effective bactericidal action. Other means will have to be sought to extend shelf-life of giblets. AS

## 106

Firm serves up diverse, innovative line of chicken products.

Jacobs, L. C.

*Food Product Development* 15 (3) 32, 36, 38 (1981)

[En]

The development of Tyson Foods, Inc., of Springdale, Arkansas, from a \$24 million chicken processor to a food company with annual sales approaching \$400 million is described. The firm currently supplies both retail and institutional markets with a complete line of chicken products ranging from raw, chilled chickens to gourmet entrees. In the retail area products include: chill-packed chickens called Tyson Country Fresh; cooked goods such as Chicken-in-a-Basket; chicken rolls and patties; chicken weiners, bologna and corn dogs; and Chick'n Quick (100% chicken meat products that are quick and easy to prepare at home). VJG

## 107

Effects of feed withdrawal on the weight, fecal excretion and *Salmonella* status of market age broiler chickens.

Rigby, C. E.; Pettit, J. R.

*Canadian Journal of Comparative Medicine* 45 (4)

363-365 (1981) [7 ref. En] [Anim. Disease Res. Inst., Agric. Canada, PO Box 11300, Sta. H, Nepean, Ontario, K2H 8P9, Canada]

Groups of market-stage *Salmonella typhimurium*-infected broilers were (i) subjected to feed withdrawal for 8 h, held in crates for 8 h and then slaughtered and weighed or (ii) treated similarly except that there was no feed withdrawal period before holding in crates. Data are presented for wt. of intestines, proportions of birds positive for salmonellae in the cecae and cloacal faeces, and the wt. and *Salmonella* count of faeces in the crates. (i) did not reduce the proportion of birds positive for salmonellae in the cecae or faeces; however, it considerably reduced the amount of faeces deposited in the cages. These results are discussed in relation to problems of contamination of carcasses with salmonellae during slaughter and subsequent processing. It is concluded that the reduction in faeces deposition in the cages could reduce the incidence of contamination of carcasses with salmonellae. AJDW

## 108

The effect of pH adjustment on the microbiology of chicken scald-tank water with particular reference to the death rate of salmonellas.

Humphrey, T. J.; Lanning, D. G.; Beresford, D.

*Journal of Applied Bacteriology* 51 (3) 517-527 (1981)

[29 ref. En] [Sci. Dep., Seale-Hayne Coll., Newton Abbot, Devon TQ12 6NQ, UK]

In laboratory experiments adjustment of the pH of chicken scald-tank water to 9.0 ± 0.2 lowered the D 52°C value of a strain of *Salmonella typhimurium* from 34.5 to 1.25 min. Factory trials where the scald water was maintained at pH 9.0 ± 0.2 for the after-lunch period showed that both the total bacterial population and the number of coli-aerogenes organisms were substantially reduced. Addition of NaOH also increased the rate of accumulation of total dry matter in the water. Na<sub>2</sub>CO<sub>3</sub> was as effective as NaOH in increasing the death rate of *Salm. typhimurium* and would appear to be a suitable alternative. AS

## 109

Production of off odours by isolates from poultry skin with particular reference to volatile sulphides.

Thomas, C. J.; McMeekin, T. A.

*Journal of Applied Bacteriology* 51 (3) 529-534 (1981) [18 ref. En] [Dep. of Agric. Sci, Univ. of Tasmania, GPO Box 252C, Hobart, Tasmania 7001, Australia]

Studies were conducted on off-odour production by psychrotrophic *Pseudomonas* strains isolated from broiler skin. *Pseudomonas* strains were cultured on sterile leg muscle and broiler skin preparations; production of S-containing volatiles on peptone broth (supplemented with methionine and cystine) and on muscle or skin as also studied. *Pseudomonas* groups I and II were the main off-odour producers. Overall, 40% of isolates produced organoleptically-detectable off-odours. Strains producing off-odours on muscle also produced them on skin. 60% of *Pseudomonas* group I strains produced off-odours, vs. 38% of group II strains. Sulphide-type odours predominated, being produced by group I and group III/IV strains; group II strains mainly produced fruity odours, although 30% also gave a sulphide-type taint. Culture in broths supplemented with methionine or cystine increased the proportion of samples producing sulphide off-odours. Methanethiol was the main off-odour produced; H<sub>2</sub>S is produced only by a minority of strains. AJDW

## 110

[Chemical and functional characteristics of mechanically deboned chicken meat and its utilization in processed meat. I. Chemical and functional characteristics of mechanically deboned chicken meat.]

Ahn, B. Y.; Kim, J. W.; Lee, Y. B.

*Korean Journal of Food Science and Technology* 13 (3) 171-175 (1981) [20 ref. Ko, en] [Lab. of Anim. Product Tech., Korea Advanced Inst. of Sci. & Tech., Seoul 131, S. Korea]

Various characteristics of hand deboned (HD) or mechanically deboned (MD) meat from (i) domestic broilers, and (ii) spent layers, were investigated, i.e. meat yield, proximate composition, functional characters, storage stability, pigment composition, protein composition, emulsifying capacity, and microbiological quality. Moisture % was 64.1 in MD (i) to 74.1 in HD (i); crude fat % was 4.5 in HD (i) to 20.6 in MD (ii); crude protein % was 11.5 in MD (ii) to 21.6 in HD (i); crude ash % was 1.02 in HD (ii) to 1.82 in MD (ii); total Ca % was 0.02 in HD (i) and (ii) to 0.41 in MD (ii). Total pigment (mg/g meat) was 1.31, 3.36, 1.38 and 3.63 in (ii) HD and MD, and (i) HD and MD, resp. (proportion of myoglobin and haemoglobin is tabulated). MD showed a higher emulsifying capacity than HD meat, probably because it also had a higher proportion of salt-soluble proteins. Max. possible storage period for MD was approx. 4 wk in the frozen state (as determined by thiobarbituric acid value). Total microbial counts were similar for HD and MD and differed little to those for red meat. [From En summ.] LH

## 111

[Chemical and functional characteristics of mechanically deboned chicken meat and its utilization in processed meat. II. Utilization of mechanically deboned chicken meat.]

Kim, J. W.; Ahn, B. Y.; Lee, Y. B.

*Korean Journal of Food Science and Technology* 13 (3) 176-180 (1981) [7 ref. Ko, en] [Lab. of Anim. Product Tech., Korea Advanced Inst. of Sci. & Tech., Seoul 131, S. Korea]

Patties and frankfurters were made with various proportions (0-100%) of mechanically deboned (MD) or hand deboned (HD) chicken meat, and their chemical composition, colour score, cooking traits, palatability, storage life, and textural properties were evaluated. Tables of results indicate that processed meat products containing MD at up to 30-35% of the total meat component gave satisfactory colour, texture and palatability quality. Frozen storage of products containing MD showed no unusual flavour problems as compared to regular products. [From En summ.] LH

## 112

Reproductive performance of dogs fed radappertized chicken for three years or more. [Lecture]

Chapple, F. E., III; Scheidt, A.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, E-3, pp. 183-184 (1980) [1 ref. En] [US Army Med. Res. & Development Command, Fort Detrick, Frederick, Maryland 21701, USA]

Comparative studies were conducted on the reproductive performance of dogs fed a control diet or frozen, thermally-processed or <sup>60</sup>Co- or electron-irradiated chicken for  $\leq 3$  yr; average irradiation dose was 59 kGy. No significant effect of diet on reproductive performance was observed. [See FSTA (1982) 14 8S1379.] AJDW

## 113

Investigation of food poisoning outbreak in Bermuda.

Anon.

*CAREC Surveillance Report* 7 (4) 1-3 (1981) [En]

A food poisoning outbreak at a hotel in Bermuda was investigated. 41 persons were interviewed, of which 19 exhibited symptoms (diarrhoea and abdominal cramps) in an onset period of 10-15 h. 18 of these people had eaten Chicken a la King at a Sunday brunch 2 days previously; the other person had not, but gave symptoms in an onset time of 4 h. Stool samples were requested from all the food handlers in the hotel and from 6 affected people. All food handlers cooperated, and 3 of the victims, and all samples were negative for the suspect organism - *Clostridium perfringens*. The manner in which the Chicken a la King was prepared, i.e. separate cooking of meat and sauce, and cooling of both prior to refrigeration (sauce was left for approx. 4 h in a 5 gal container at ambient temp. before refrigeration), and subsequent reheating, being served and kept hot in a warming dish, and the fact that symptoms of the poisoning did not involve vomiting seemed to point to a *C. perfringens* outbreak, but no conclusive evidence of this was found. LH

## 114

The influence of packaging in flexible films and light on the shelf-life of fresh chicken broiler carcasses. Igbinodion, J. E.; Orr, H. L.; Johnston, R. A.; Gray, J. I. *Poultry Science* 60 (5) 950-955 (1981) [26 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Batches of grade-A ice-chilled broilers, wt approx. 1.7 kg, were (i) vacuum packaged in Grace Barrier bags and heat shrunk, (ii) vacuum packaged in Grace Super L bags, or (iii) tray packaged by overwrapping with L-film and heat shrunk. They were then stored in the dark or under fluorescent light for 2, 9 or 16 days at -2° or +1°C, or for 2 or 9 days at +5°C. Aerobic plate counts, fluorescent *Pseudomonas* counts and TBA values were determined; tables of results are given. (i) and (ii) generally had lower counts than (iii); (i) had lower counts than (ii). Storage under illumination increased fluorescent *Pseudomonas* counts for all 3 packaging methods, but increased aerobic plate count only for (ii) and (iii). Bacterial counts increased with increasing storage time and temp. TBA values tended to increase with increasing storage temp.; they tended to decrease after the second day of storage. The TBA value appeared to be inversely related to bacterial count, suggesting that bacteria may have influenced the TBA value. AJDW

## 115

Survival of *Campylobacter jejuni/coli* in ground refrigerated and in ground frozen beef liver and in frozen broiler carcasses.

Hänninen, M.-L.

*Acta Veterinaria Scandinavica* 22 (3/4) 566-577 (1981) [28 ref. En, no] [Dep. of Food Hygiene, Coll. of Vet. Med., Helsinki, Finland]

6 strains of *Campylobacter jejuni/coli* were used in studies on its survival in ground beef liver stored at 4° or -20°C, and in broilers at -20°C. Inoculum size was 10<sup>5</sup>-10<sup>6</sup>/g for the ground liver; broiler carcasses were dipped in suspensions containing 10<sup>3</sup>-10<sup>4</sup> or 10<sup>5</sup>-10<sup>6</sup> cells/ml before freezing. Counts of *C. jejuni/coli* did not change significantly in ground liver during 6 days at 4°C; the liver was unfit for human consumption after this storage period. In frozen ground beef liver, the *C. jejuni/coli* count decreased by a factor of 2-3 log during 12 wk storage; 90% of the *C. jejuni/coli* became unviable during the first few days. In frozen broiler carcasses, decrease in *C. jejuni/coli* count during 12 wk of storage was approx. 2 log for animal-derived strains, 0.5-1 log for human-derived strains. Counts were higher for drip than for skin samples from the broilers. AJDW

## 116

[Use of proteolytic enzymes in feeds for broilers.] Bonsembiante, M.; Susmel, P.

*Rivista di Zootecnia e Veterinaria* 9 (5) 316-327 (1981) [35 ref. It, en] [Istituto di Zootecnica, Univ. degli Studi di Padova, Padua, Italy]

Groups of Hubbard and Hybro chicks were used in studies on effects of addition of microbial protease preparations (AP 114 from *Aspergillus niger* and SP 1

from *Rhizopus rhizophodiformis*) to the diet on performance and carcass quality of broilers; an uncharacterized enzyme extract from yeast was also evaluated. Trials were conducted with diets of various protein contents, with or without added virginiamycin. Data are given for daily gain, feed conversion, slaughter yield, and moisture, protein, lipid, ash and energy contents of the carcass. Little effect of dietary enzyme supplements on the carcass yield or composition was observed; slaughter age, dietary protein level and virginiamycin all significantly influenced carcass composition. AJDW

## 117

Precooking and flake size effects on spent fowl restructured steaks.

Seideman, S. C.; Durland, P. R.; Quenzer, N. M.; Michels, J. D.

*Journal of Food Protection* 45 (1) 38-40, 45 (1982) [20 ref. En] [Dep. of Anim. Sci., S. Dakota Agric. Exp. Sta., S. Dakota State Univ., Brookings, S. Dakota 57007, USA]

4 formulations of spent fowl muscle, each made to contain 40% dark muscle and 60% white muscle, were prepared as follows: raw meat, large flake size; raw meat, small flake size; precooked meat, large flake size and precooked meat, small flake size. Each formulation was mixed with 0.3% NaCl, 0.25% sodium tripolyphosphate and 0.25% hydrolysed vegetable protein for 10 min, pressed into logs under 400 lb/in<sup>2</sup>, frozen and cut into steaks. Steaks were evaluated for moisture and fat content, cooking properties, texture and sensory attributes. Restructured steaks made from precooked chicken muscle had lower initial moisture contents and lost less moisture during cooking than restructured steaks made from raw meat. Flake size had no significant effect on cooking losses; however, the smaller flake sizes contributed to a more tender product. Steaks made from the raw chicken meat were of a more acceptable flavour. Restructured steaks made from raw flakes were significantly more desirable in texture and overall palatability and were more tender and juicy than restructured steaks made from precooked chicken. AS

## 118

Microbiological quality of vacuum packaged poultry with or without chlorine treatment.

Kraft, A. A.; Reddy, K. V.; Hasiak, R. J.; Lind, K. D.; Galloway, D. E.

*Journal of Food Science* 47 (2) 380-385 (1982) [En] [Dep. of Food Tech., Iowa State Univ., Ames, Iowa 50011, USA]

Dry packed broilers were cut up or kept as whole carcasses and vacuum packaged in a high barrier or low barrier film or stretch wrapped in a tray package. In an additional study, chicken was treated with 20 p.p.m. chlorine in a chilled water dip; control chicken had no chlorine added to the water. The poultry was then packaged as previously indicated. The chicken was stored in a display case at about 5°C and examined for various bacteria and odour development at intervals up to 10 days. Vacuum packaging dry packed broilers resulted in significantly lower bacterial counts and

longer keeping time compared with stretch wrapped chicken. Longest shelf life was obtained with a high barrier film, and chlorine as a dip did not provide increased storage life compared with vacuum packaged broilers maintained in the dry state. IFT

## 119

**Protein efficiency ratio and amounts of selected nutrients in mechanically deboned spent layer meat.**  
Mott, E. L.; MacNeil, J. H.; Mast, M. G.; Leach, R. M. *Journal of Food Science* 47 (2) 655-656, 663 (1982) [En] [Dep. of Food Sci., Pennsylvania State Univ., University Park, Pennsylvania 16802, USA]

3 types of mechanically deboned spent layer meat (MDSL) were found to have adjusted protein efficiency ratios (PER) equivalent or superior to a standard (casein) diet. These same materials proved to be good sources of Ca, Fe and Zn. Percentage protein ranged from 15.39 for MDSL from whole spent layers to 16.55 for MDSL from spent layer frames with wings. Fat levels were highest for whole birds (20.41%), and lowest for frames without skin (16.84%). High levels of unsaturated fatty acids were found to be associated with these products. IFT

## 120

**Radurization of poultry meat. [Lecture]**

Piszer, W.; Zabielski, J.; Mroz, J. *Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, E-22, pp. 248-251 (1980) [16 ref. En] [Acad. of Agric., Poznan, Poland]  
Broilers (carcass wt 0.9-1.2 kg), including pale soft exudative, normal and dark firm dry samples, were vacuum-packaged and irradiated at 2.5 and 5.0 kGy. Changes in sensory characteristics, microbiological properties and fat characteristics (TBA value, peroxide value, free fatty acid concn.) during storage for up to 28 days at 4°C were determined. Little effect of irradiation on fat quality indices was observed. Differences in sensory properties of the irradiated carcasses were of only moderate practical significance; Vienna sausages made from irradiated broiler meat were, however, of poor sensory quality. Total plate count of chicken decreased considerably as a result of irradiation, then increased gradually during storage. Radiation resistance of *Pseudomonas* and *Bacillus* isolates is considered. [See FSTA (1982) 14 8S1379.] AJDW

## 121

**Mutagenicity studies with irradiated meats. [Lecture]**  
Fruin, J. T.; Kuzdas, C. D.; Guthertz, L. S. *Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, E-20, pp. 241-244 (1980) [5 ref. En] [Div. of Nutr. Tech., Letterman Army Inst. of Res., Presidio of San Francisco, California, USA]  
Studies were conducted by a modified Ames *Salmonella*-mammalian enzyme mutagenicity test to evaluate mutagenicity of frozen, thermally sterilized, electron-irradiated or  $\gamma$ -irradiated beef or chicken.

Problems were experienced with false-positive revertants, possibly due to presence of a water-soluble growth factor (subsequently identified as histidine). Particulate matter from whole meat samples caused difficulties with counting. The method was modified to overcome these problems; no mutagenic activity was detected in any of the meat samples. [See FSTA (1982) 14 8S1379.] AJDW

## 122

**[Effect of new feed additives of animal origin on meat quality.] [Lecture]**

Avyasov, I. M.; Pankov, N. F.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, F-10, pp. 290-291 (1980) [Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsopererabatyvayushchei i Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

A new feed additive (based on degummed bone and bone fat) was fed to (i) Large White pigs (at 4% basic ration) and to (ii) 30-day-old broilers (at 3% basic ration). Data are tabulated for test animals and controls (receiving basic ration only) on the chemical composition (moisture, ash, crude protein, fat and pH) of *longissimus dorsi*, internal fat and back fat (acid and peroxide values) for (i), and on % edible parts of the carcass and chemical composition (moisture, crude protein, fat and ash) of breast and thigh muscles for (ii). Results of these analyses, and organoleptic evaluation of roasted and fried pork, and of chicken broth and roast chicken, showed no significant differences between test and control animals. [See FSTA (1982) 14 8S1379.] RAW

## 123

**Effect of irradiation, packaging and antioxidants on the concentration of monocarbonyls in chicken rolls. [Lecture]**

Hall, K. N.; Fey, M. B.; Buonapane, G. J.; Jensen, R. G.; Wiericki, E.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, E-16, pp. 225-228 (1980) [7 ref. En] [Univ. of Connecticut, Storrs, Connecticut, USA]

Chicken white meat/skin rolls were made with or without antioxidants (0.01% BHT, 0.0025% sodium ascorbate, 0.0025% ascorbic acid), packaged under low or high vacuum, frozen at -45°C, irradiated (0, 30 or 60 kGy) and stored at -29°C. Samples were analysed for fatty acids, carbonyl compounds, moisture, ash, protein, fat, NaCl, inorganic P, and TBA values. Decreases in linoleic and linolenic acids were observed in irradiated samples, the decrease increasing with increasing radiation dose; this effect was reduced in the presence of antioxidants, or if samples were packaged under high vacuum. Irradiation retarded lipid oxidation as measured by the TBA test. TBA values and carbonyl concn. were low for all samples with antioxidants. Irradiation increased saturated carbonyl concn. [See FSTA (1982) 14 8S1379.] AJDW

## 124

[Nutritional value of poultry meat products for infant feeding.] [Lecture]  
Korotaeva, M. M.; Krainyaya, V. S.; Gonotskii, V. A.; Peretolchin, N. V.; Brents, M. Ya.; Levyant, P. P.; Terekhin, S. P.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. I, G-8, pp. 342-344 (1980) [9 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsepererabatyvayushchei Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

Preliminary animal feeding trials were performed to assess the nutritional value of chicken preserves intended for infant feeding. The preserved chicken product [PCP] was sterilized at 125°C and compared nutritionally with control products of raw and blanched chicken. Results indicate the high nutritional value of PCP. Further trials were performed on the nutritional value of PCP with 2.5% added starch (corn and potato starch or corn phosphate starch); PCP without starch addition served as the control. Modified starch (corn phosphate starch) proved unsuitable for inclusion in PCP. Additionally, TLC, GLC and polarography were used to determine contents of organochlorine pesticides and heavy metals, and antibiotics content was determined by a microbiological method in chicken used for the PCP. The end product satisfied all the requirements for infant formulae, and clinical trials confirmed its suitability. [See FSTA (1982) 14 8S1379.] RAW

## 125

[Changes in nitrogenous substances during sterilization of homogenized preserves.] [Lecture]  
Gonotskii, V. A.; Chvanenko, I. I.; Shirnyuk, T. Ya.; Pavlova, V. A.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-10, pp. 148-150 (1980) [3 ref. Ru] [Nauchno-proizvodstvennoe Ob"edinenie Ptitsepererabatyvayushchei Kleezhelatinovoi Promyshlennosti 'Kompleks', Moscow, USSR]

In trials to determine optimum sterilization conditions for the product, homogenized chicken meat preserves were sterilized at 115-135°C for 15-70 min. Data are tabulated on the nitrogen forms (total, protein, non-protein, residual, polypeptide and  $\alpha$ -amino N) in (i) the raw chicken meat, (ii) preserves before sterilization, and (iii) sterilized products, and on the free and total amino acid content for (i)-(iii). Results illustrate the hydrolysis of protein substances to polypeptides, peptides and free amino acids, and the destruction of several amino acids, including cystine and methionine, which reduces the nutritional value of the product. Sterilization at 125-130°C gave products with the highest nutritional value. [See FSTA (1982) 14 8S1379.] RAW

## 126

[Chilling and freezing meat in air under excess pressure.] [Lecture]

Chumak, I. G.; Krasnomovets, P. G.; Kotsyubinskii, A. P.; Babich, A. K.

*Proceedings of the European Meeting of Meat Research Workers* No. 26, Vol. II, L-12, pp. 155-157 (1980) [Ru] [Odesski Tekh. Inst. Kholodil'noi Promyshlennosti, Odessa, USSR]

Laboratory experiments were performed on the cooling rate of fresh chicken carcasses chilled under various air pressures. Results, presented in graph form, indicate that intensive chilling and freezing of meat under excess pressure with forced air circulation shortens thermal treatment of the product, reduces the drying effect, and improves meat quality. Optimal parameters for meat freezing are: air speed, 1.5-2 m/s; pressure of cooling medium, 0.8-1.0 MPa, and air temp., 243 K. [See FSTA (1982) 14 8S1379.] RAW

## 127

[Influences of diet on the body composition of chicks. (In 'Proceedings, 1981 Cornell Nutrition Conference for Feed Manufacturers' [see FSTA (1982) 14 8G513]) [Lecture]

Combs, G. F., Jr.; Baker, R. C.; El-Begearmi, M. M. pp. 103-108 (1981) [7 ref. En] [Dep. of Poultry & Avian Sci., Cornell Univ., Ithaca, New York 14850, USA]

2 experiments were conducted to study effect of grower-finisher diets on carcass composition of broiler hens. Broilers were reared, in the 1st study, to 39 days and fed 1 of 5 finisher diets for 10 days, i.e. a control, and 4 isonitrogenous alternatives based on an additional 4.2% crude protein as diammonium citrate, diammonium phosphate, hydrolysed feather meal, or urea. In the 2nd study, 2 other sources of nonprotein N, i.e. a commercial ammonium polyphosphate and ammonium sulphate, were examined, from 25 to 52 days of age. Carcass wt. and composition as water, ash, fat and protein was determined, and abdominal and gizzard fat measured. Results are tabulated, and indicate that the source of nonprotein N may affect carcass fat in broilers. Further work is recommended. LH

## 128

[Studies on rice polish as a major source of energy in broiler diets.]

Narahari, D.; Venugopal, K.; Gabriel Raj, A.;

Kothandaraman, P.; Venkataramanujam, V.

*Cheiron* 10 (3) 106-110 (1981) [8 ref. En] [Dep. of Poultry Sci., Madras Vet. Coll., Madras-7, India]

224 Cornish chicks, 1 day old at the start of the experiment, were used in a study on effects of diets containing rice polish at levels of 0, 20, 30 or 40% (replacing maize) on performance and carcass quality. The broilers were slaughtered at 8 wk of age. Data are given for ready-to-cook yield and skin colour. No significant differences in the characteristics studied were observed. AJDW

## 129

[Comparative examination of media for isolating salmonellae from chicken liver samples.]

Vergleichende Untersuchungen von Nährböden zur Isolierung von Salmonellen aus Geflügelleberproben. Hartgen, H.

*Fleischwirtschaft* 60 (11) 2049-2052; 2055-2057 (1980) [14 ref. De, en] [Fasanergartenstrasse 157, 800 Munich 90, Federal Republic of Germany]

A study was made of 166 samples of chicken livers offered for sale in food shops. Pril-mannitol-agar and brilliant green-phenol red-lactose-sucrose-agar were used as media for isolating salmonellae, as the samples

were heavily contaminated with *Proteus* bacteria. *Salmonellae* were isolated from >50% of the samples examined. Pril-mannitol-agar was distinctly superior to the classical TPE medium normally used, because of its greater sensitivity and specificity. AS

### 130

#### Influence of feed additives on growth rate and ready to-cook yield of White Leghorn male chicks.

Sundaresan, K.; Venkataramanujam, V.; Sheriff, F. R.; Sigamani, S.; Kothandaraman, P.

*Cheiron* 10 (3) 101-105 (1981) [15 ref. En] [Dep. of Poultry Sci., Madras Vet. Coll., Madras-7, India]

300 male White Leghorn chicks were used in studies on effects of diets (i) with feed additives, (ii) with the feed additive TM 10, and (iii) with the feed additive 3-nitro Hoechst. The feed additives were used at the levels recommended by the manufacturers. The broilers were slaughtered at 8 wk of age. The ready-to-cook yield of the birds was (i) 66.64%, (ii) 67.27% and (iii) 68.11%. These differences were significant. AJDW

### 131

#### Microbiology of poultry parts dipped in potassium sorbate.

Cunningham, F. E.

*Poultry Science* 60 (5) 969-971 (1981) [17 ref. En] [Dep. of Anim. Sci. & Ind., Kansas State Univ., Manhattan, Kansas 66505, USA]

Fresh broiler drumsticks were either (i) dipped in a culture of *Salmonella typhimurium* NRRC B-411 or (ii) not dipped in the culture, then dipped in distilled water or 2.5%, 5.0%, 10.0% or 15.0% potassium sorbate solution, drained for 10 min, and packaged in sterile polyethylene bags. The packaged drumsticks were then stored for up to 12 days at 4°C, or up to 6 days at 10° or 22°C. Graphs of results are given. At 4°C, (ii) samples (initial total plate count  $10^2/cm^2$ ) reached total plate counts of  $10^7/cm^2$  after 10 days if not sorbate treated, vs.  $10^5/cm^2$  if treated in a 10% sorbate dip. The 10% sorbate dip samples had counts of only  $10^6/cm^2$  after 12 days. For (i) samples stored at 10°C, *Salmonella* count increased throughout storage, but decreased with increasing sorbate concn. in the dip solution. *Salmonella* counts after 6 days' storage were approx.  $10^8/cm^2$  for the distilled water dip, vs.  $10^6$  for the 10% sorbate dip. Results at 22°C confirmed that sorbate dips considerably reduce growth of *salmonellae*. AJDW

### 132

#### The pharmacokinetic profiles of ochratoxin A in pigs, rabbits and chickens.

Galtier, P.; Alvinerie, M.; Charpentier, J. L.

*Food and Cosmetics Toxicology* 19 (6) 735-738 (1981) [18 ref. En] [Lab. de Pharmacologie-Toxicol., INRA, 180 Chemin de Tournefeuille, 31300 Toulouse, France]

Investigations were carried out to determine the fate of ochratoxin A in the plasma after oral and intravenous administration in animals kept for meat: pigs, rabbits and chickens. Ochratoxin A was administered at dose levels of 0.5, 2 and 2 mg/kg body wt., resp. Concn. of the

ochratoxin in the plasma were measured for  $\leq 120$  h following treatment. 65.7, 55.6 and 40.0% of the administered dose was absorbed by pigs, rabbits, and chickens resp. On the basis of pharmacokinetic data obtained in this study the problem of residues can be predicted as follows. There will be a problem in rabbits and chickens due to the wide distribution of ochratoxin A in the organism. In pigs the hazard will arise because of the persistence of residues. VJG

### 133

#### The use of subjective evaluation of the conformation of live chicken in broiler breeding programmes.

Ulaganathan, V.; Sethumadhavan, V.; Venkataramanujam, V.; Sundaresan, K.

*Cheiron* 10 (3) 117-126 (1981) [27 ref. En] [Dep. of Anim. Genetics, Madras Vet. Coll., Madras-7, India]

Groups of White Rock and Cornish broilers and crosses between these 2 breeds were used in studies on subjective evaluation of conformation of chickens on the basis of fleshing grade, breast angle and body wt. Data for these characteristics are given, together with heritabilities and phenotypic, genetic and environmental correlations. The relation of these characteristics to dressing % was also evaluated. Dressing % did not differ significantly between purebred and crossbred animals. Dressing % increased with decreasing fleshing grade; the correlation between these characteristics was only -0.1390. AJDW

### 134

#### Antibacterial effects of butylated hydroxyanisole (BHA) against *Bacillus* species.

Shelef, L. A.; Liang, P.

*Journal of Food Science* 47 (3) 796-799 (1982) [En] [Div. of Food Sci. & Human Nutr., Wayne State Univ. Detroit, Michigan 48202, USA]

The antibacterial effect of BHA was evaluated in laboratory media and in 2 foods. In nutrient broth growth of *Bacillus* species (3 strains of *B. cereus*, 2 of which were enterotoxigenic, and 1 strain each of *B. subtilis* and *B. megaterium*) was inhibited by 75 p.p.m. BHA. In tests with food systems, growth inhibition of vegetative cells of these organisms required 1000 p.p.m. in cooked rice and 5000 p.p.m. in strained chicken. Effect of BHA was bacteriostatic at the tested levels ( $\leq 200$  p.p.m. in laboratory media and  $\leq 10\ 000$  p.p.m. in the food systems), and viable cells were recovered from all samples. Bacterial growth resumed in samples which contained bacteriostatic levels of BHA after dilution with antioxidant free broth or food. IFT

### 135

[Process and apparatus for introducing innards into slaughtered chickens without innards.] Verfahren und Vorrichtung zum Einbringen von aufbereiteten Innereien in ausgenommene Schlacht-Hähnchen. Kamphaus, J. (Gebr. Stolle GmbH & Co. KG)

*German Federal Republic Patent Application* 3 015 336 (1981) [De]

A machine is described for introducing chicken innards, wrapped in a plastics bag, into the chicken while it passes along a transport path, suspended by its legs. The bags of innards follow a similar transport path to the chickens and are inserted into the chicken opening by a ram. W&Co

## 136

[Feeding of pelleted or free-flowing mixture to broilers with regard to sex and feeding procedure.]

Chrappa, V.; Resovsky, S.

*Zivocisna Vyroba* 26 (4) 293-301 (1981) [14 ref. Sk, ru, en, de] [Ustav Fyziologie Hospodarskych Zvierat SAV, Pracovisko, 900 28 Ivanka pri Dunaji, Czechoslovakia]

Groups of Slovgal day-old male and female chicks were reared to broiler wt. on deep litter or in cages, receiving pelleted or free flowing feed mixtures. Against a background of better utilization of the pelleted mixtures, no significant differences were found in dressing-out % or proportion of edible parts of the different groups of birds slaughtered at 1300-1400 g for males and 1100-1300 g for females. SKK

## 137

The influence of dietary energy and amino acid levels on abdominal fat pad development of the broiler chicken.

Mabray, C. J.; Waldroup, P. W.

*Poultry Science* 60 (1) 151-159 (1981) [31 ref. En] [Dep. of Anim. Sci., Univ. of Arkansas, Fayetteville, Arkansas 72701, USA]

Broilers were fed diets with energy levels of 2970, 3190 or 3410 kcal metabolizable energy/kg feed, and formulated to have 70, 80, 90, 100 or 120% of the recommended National Research Council levels. The birds were slaughtered at 57 days of age and total carcass wt., eviscerated carcass wt. and abdominal fat pad wt. were determined. Tables of results are given. Carcass wt. increased with increasing dietary energy and amino acid levels. Abdominal fat pad wt. increased with increasing dietary energy level, but decreased with increasing dietary amino acid level. Adjustment of fat pad wt. to constant carcass wt. considerably reduced difference between birds fed different energy levels. Significant sex  $\times$  energy level and sex  $\times$  amino acid interactions were observed for fat pad wt. AJDW

## 138

Proximate analyses, selected vitamins and minerals and cholesterol content of mechanically deboned and hand-deboned broiler parts.

Ang, C. Y. W.; Hamm, D.

*Journal of Food Science* 47 (3) 885-888 (1982) [En] [Richard B. Russell Res. Cent., USDA/ARS, PO Box 5677, Athens, Georgia 30613, USA]

Samples of commercial mechanically deboned broiler product derived from necks, with and without skin, backs and rib cages, separately and combined into blended mixture were analysed. Moisture content ranged from 62.7 to 73.4%, fat from 13.2 to 25.2%, protein from 10.3 to 11.9% and ash from 0.74 to 0.94%. Vitamin analyses (mg/100 g wet wt.) included: thiamin 0.051-0.068, riboflavin 0.128-0.211, niacin 2.50-3.39, vitamin B<sub>6</sub> 0.094-0.149, and pantothenic acid 0.581-0.700. Cholesterol content was 94.2-129.1 mg/100 g wet wt. Mineral content (mg/100 g) was K 123-151, Na 48-

62, Ca 53-91, Mg 13-15, Zn 1.13-1.78, Fe 1.45-1.86, Mn 0.019-0.026, and Cu 0.029-0.034. One batch each of necks with and without skin, and backs was hand deboned and analysed. Ca and cholesterol contents were 350 and 14% higher, resp., in mechanically deboned products as compared to the hand-deboned counterparts. There were differences in vitamin levels due to source of material, but not due to method of deboning. IFT

## 139

Influence of protein level and strain on broiler yields.

Haizlip, M. B.; Andrews, L. D.; Goodwin, T. L.

*Arkansas Farm Research* 30 (3) 16 (1981) [En] [Univ. of Arkansas Agric. Exp. Sta., Fayetteville, Arkansas 72701, USA]

Broilers of 3 strains received a 21% protein diet for the first 3 wk; females were then assigned to groups receiving diets with either 17% or 21% protein, all males remained on the 21% protein diet. The birds were slaughtered at 56 days of age. Tables of data are given for eviscerated wt., and wt. of wings, breast, back, drums, thighs, breast meat and breast bones. Dietary protein level did not significantly affect any of the characteristics studied in the female broilers. Sex significantly influenced all the variables studied (all values being higher for males). Most of the characteristics studied differed significantly between strains. AJDW

## 140

Abdominal fat of broilers as influenced by dietary level of animal fat.

Deaton, J. W.; McNaughton, J. L.; Reece, F. N.; Lott, B. D.

*Poultry Science* 60 (6) 1250-1253 (1981) [10 ref. En] [USDA, Sci. & Education Administration, Agric. Res., S. Cent. Poultry Res. Lab., Mississippi State, Mississippi 39762, USA]

In an attempt to determine the effect of dietary energy source on the quantity of abdominal fat in broilers, 3 levels of dietary animal fat (4, 7, and 10%) in isocaloric and isonitrogenous diets were fed in place of a carbohydrate energy source. 3 trials were conducted. As dietary animal fat increased, the amount of abdominal fat in broilers increased under both a moderate- and a high-temp. rearing regimen. However, as dietary animal fat increased, the body wt. gain in broilers tended to increase. It is possible that the benefits of increased growth outweigh the disadvantages of increased abdominal fat when dietary fat is added. Data are presented to provide the industry with figures to help in this decision. AS

## 141

The association between sartorial fat and fat deposition in meat-type chickens.

Burgener, J. A.; Cherry, J. A.; Siegel, P. B.

*Poultry Science* 60 (1) 54-62 (1981) [19 ref. En] [Poultry Sci. Dep., Virginia Polytech. Inst. & State Univ., Blacksburg, Virginia 24061, USA]

A series of studies conducted to evaluate the

potential for use of wt. of the *sartorius* muscle fat depot for prediction of total or abdominal depot fat is described. Effects of age, line and protein content of the diet were studied. Tables and graphs of data are given, showing body wt., abdominal fat wt. and % total carcass fat wt. and %, and left and right sartorial fat wt. and %. Sartorial fat was found to be closely correlated with abdominal and carcass fat, in various lines; the dw (dwarf) gene did not significantly alter the characteristics studied. Abdominal and sartorial fat wt. and % were lower for high-protein than for low-protein diets. Sartorial fat wt. were not significantly correlated with abdominal or carcass fat wt. at 14 days of age; they were significantly correlated with abdominal fat wt. at 28, 42 and 56 days of age, and with total carcass fat at 28 and 42 days of age. AJDW

## 142

[Procaine penicillin G residues in muscle, kidney and liver of broilers inoculated with therapeutic doses.]  
Moreno, B.; Calles, A.  
*Anales de Bromatología* 32 (3) 207-214 (1980) [24 ref. Es, en] [Fac. de Vet., Leon, Spain]

Procaine penicillin G residues were determined in muscle, kidney and liver of broilers 2, 12, 24 and 48 h after inoculation by intramuscular injection with 5000, 10 000, 20 000 or 100 000 IU/kg live wt. Quantitative detn. was done by a diffusion method using cylinders on agar plates seeded with *Sarcina lutea* ATCC 9341 (sensitivity 0.0625 IU/g of tissue). Tabulated results showed that initial concn. (after 2 h) were highest in kidneys, lowest in muscle. The level of residues was about equal for kidney and liver, lower for muscle. 48 h after inoculation residues in all tissues were only just detectable after doses of 5000-20 000 IU, and were 0.066 in liver, 0.063 in kidney after 100 000 IU/kg. The results are discussed in relation to potential health hazards (allergic reactions, development of resistance in bacteria). Tolerances and withdrawal times are recommended. [From En summ.] RM

## 143

The effect of intermittent light on carcass quality, feed efficiency, and growth of broilers.  
Cave, N. A.  
*Poultry Science* 60 (5) 956-960 (1981) [18 ref. En]  
[Anim. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Canada K1A 0C6]

A total of 2400 broiler chicks of both sexes and of 2 commercial strains were reared in an environment of either intermittent lighting (IL) of 1 h light:3 h dark, or extended lighting (EL) of 23.5 h light:0.5 h dark from 15 to 48 or 55 days of age. The IL significantly ( $P < 0.05$ ) reduced leaf fat, % grade A carcasses, and feed:gain ratio of female broilers at 48 and 55 days. There was no difference in wt. gain or carcass wt. except that carcass wt. of females at 42 days was ( $P < 0.05$ ) lower with IL. Male chicks receiving IL had fewer grade A carcasses at 48 days for one of 2 strains used; lower leaf fat at 55 days and lower feed:gain ratios. There was no difference in body or carcass wt. at either age. Results indicate that adoption of IL can enhance carcass quality by reducing carcass fatness and improve efficiency of broiler production. AS

## 144

Effect of nitrite and sorbate on total number of aerobic microorganisms in chicken white and dark meat patties.

Bushway, A. A.; Ficker, N.; Jen, C.

*Journal of Food Science* 47 (3) 858-860, 863 (1982)  
[En] [Dep. of Food Sci., Holmes Hall, Univ. of Maine, Orono, Maine 04469, USA]

Effects of nitrite, sorbate and combinations of these 2 ingredients plus salt on the number of aerobic microorganisms in chicken white and dark meat patties were examined. All patties were stored at 4-5°C for 12 days. Nitrite concn. of 400 and 2500 p.p.m. were effective in preventing bacterial growth in chicken white meat patties, while 2500 p.p.m. was required to prevent growth in dark meat. A reduction in bacterial growth (4-10 days) was demonstrated with 100 and 150 p.p.m. nitrite in chicken white meat patties.

400 p.p.m. nitrite reduced bacterial growth in dark meat patties for 6 days. In white meat patties, use of sorbate (0.26%) in combination with nitrite (40 p.p.m.) was as effective in reducing bacterial growth at higher concn. of nitrite; salt (2.5%) alone or in combination with sorbate (0.26%) or nitrite (40 p.p.m.) inhibited bacterial growth in both white and dark meat patties during the first 4-6 days storage. IFT

## 145

Factors affecting growth and toxin production by *Clostridium botulinum* type E on irradiated (0.3 Mrad) chicken skins.

Firstenberg-Eden, R.; Rowley, D. B.; Shattuck, E. G.  
*Journal of Food Science* 47 (3) 867-870 (1982) [En]  
[US Army Natick R&D Lab., Food Microbiol. Group, Sci. & Advanced Tech. Lab., Natick, Massachusetts 01760, USA]

A model system (chicken skins with chicken exudate) was used to determine if *Clostridium botulinum* type E (Beluga) spores, stressed by low dose irradiation, would develop and produce toxin at abuse temp. of 10° and 30°C in the absence of characteristic spoilage. Unstressed spores germinated, multiplied, and produced toxin on vacuum-packaged chicken skins, stored at either 30° or 10°C. Cell numbers increased faster and toxin was evident sooner at 30° than at 10°C. At 30°C, growth occurred and toxin was produced more slowly when samples were incubated aerobically than anaerobically. When samples were incubated aerobically at 10°C, no toxin was detected within a test period of 14 days. An irradiation dose of 0.3 Mrad at 5°C reduced a spore population on vacuum-sealed chicken skins by about 90%. The surviving population produced toxin at 30°C under either aerobic or anaerobic conditions; at 10°C no toxin was detected even on skins incubated anaerobically. Under the worst conditions (30°C, vacuum packaged) toxin was not detected prior to characteristic spoilage caused by the natural flora surviving 0.3 Mrad. IFT

## 146

**Distribution of hydrocarbons and fatty acids in meats imported into Italy.**

Bernardini, M. P.; Boniforti, L.; Citti, G.; Mosini, V.  
*Food Chemistry* 8 (1) 51-60 (1982) [10 ref. En] [Istituto Superiore di Sanita, Viale Regina Elena, 299 00161 Rome, Italy]

Samples of pork, veal and chicken products, imported into Italy from other EEC countries were analysed to ascertain saturated and unsaturated hydrocarbon levels. GLC-MS analysis showed overall *n*-alkane levels to be in the range 0.3-10.5 p.p.m. *N*-alkanes ranged from C12 to C33. Phytenes were only found in bovine tissue. No alkenes were present in any of the samples analysed.

AS

## 147

**Yield and sensory quality characteristics of chicken loaf with varying concentrations of texturized vegetable proteins and soy protein isolate.**

Samaniego, C. L.; Sison, E. C.; Pimentel, L. A.  
*Philippine Agriculturist* 64 (2) 135-142 (1981) [14 ref. En] [Dep. of Food Sci. & Tech., UPLB, Laguna, Philippines]

Chicken loaves were processed with different concn. of soy protein isolate (SPI) and texturized vegetable protein (TVP) as meat substitutes, using: 1%, 2% and 3% SPI; 10%, 20% and 30% TVP; and control. Cooking yield, sensory qualities and unit cost of the loaves were evaluated. Cooking yield of chicken loaves increased significantly with level of soy proteins, reaching 94.4% at 3% SPI substitution and 89.1% at 30% TVP substitution. Meat flavour and juiciness of SPI-substituted loaves were generally higher than that of the control and TVP-substituted chicken loaves. Increased substitution of soy protein isolate (SPI) made the texture finer in the treated samples. At 3% SPI substitution, the texture was neither coarse nor fine. Based on the different parameters for evaluation (beany flavour, meat flavour, juiciness and texture), SPI-substituted chicken loaf was more acceptable than the all-meat chicken loaves. No significant differences were observed between control loaves and SPI-substituted loaves in terms of beany flavour. For TVP-substituted chicken loaves, perceptible beany flavour was detected with increasing amounts of TVP substitution ( $P \geq 0.05$ ), hence palatability decreased. Unit cost of chicken loaves decreased with increased level of SPI and TVP substitution. The 30% TVP-substituted chicken loaves had the least cost per unit among all the formulations tested, but 3% SPI substitution was organoleptically more acceptable. UPLB

## 148

**The occurrence of salmonellae during the rearing of broiler birds.**

Morgan-Jones, S. C.

*British Poultry Science* 21 (6) 463-470 (1980) [9 ref. En] [Dep. of Microbiol., Edinburgh School of Agric., West Mains Road, Edinburgh EH9 3JG, UK]

The incidence of salmonellae was studied in 2 broiler houses at each of 2 commercial sites in an integrated

commercial enterprise. Salmonellae were not isolated from the empty, cleaned and fumigated houses, and only on one occasion from feed. Salmonellae were isolated from the environment of the chicks and spasmodically from the litter, water troughs and dust. The incidence of infection of the chicks did not influence the number of isolations of salmonellae from the environment of the birds during rearing. Water in the water troughs, rather than feed, appeared to be the major oral route of infection or re-infection of birds during rearing. AS

## 149

**Studies on the marinating of chicken parts for deep-fat frying.**

Chen, T. C.

*Journal of Food Science* 47 (3) 1016-1017, 1019 (1982) [En] [MAFES, Poultry Sci. Dep., Mississippi State Univ., Mississippi 39762, USA]

8 piece-cut broiler parts were either still-marinated or marinated in a hexagonal shaped drum rotated at 31.5 p.p.m. The marinated parts were coated and deep-fat fried at 168°C for 12 min. The marinating process increased frying yields of fried parts. Although the longer rotary-marinating time resulted in higher marinade absorption as compared to the still-marinated ones, frying yields were about the same. The variance of marinade penetration between part types was smaller for those still-marinated than for those rotary-marinated. Except for the drumsticks, marinade penetration from 4 h of still-marinating can be accomplished by rotary-marinating the parts for 10 min. IFT

## 150

**[Organochlorine insecticide residues in meats consumed in Korea.]**

Kim, Y. H.; Han, Y. H.; Lee, S. R.

*Korean Journal of Food Science and Technology* 13 (3) 194-201 (1981) [25 ref. Ko, en] [Environment Div., Korea Advanced Energy Res. Inst, Seoul 131, S. Korea]

80 samples of beef, pork and chicken were collected throughout Korea and analysed for fat content and organochlorine pesticide residues. The average residue levels (total of  $\alpha$ -HCH,  $\beta$ -HCH, heptachlorepoxyde, DDE) on a fat basis were (p.p.m.) 0.466 in domestic beef, 0.145 in imported beef, 0.264 in pork and 0.106 in chicken; fat content was correspondingly 2.5-25.8 g/100 g, 3.3-12.1, 3.7-58.0 and 4.5-22.9. The order of residues (in terms of proportion) was  $\alpha$ -HCH > DDE > heptachlorepoxyde >  $\beta$ -HCH. Daily intake/person was estimated to be 1.0  $\mu$ g of total HCH, 0.1  $\mu$ g heptachlorepoxyde, and 0.3  $\mu$ g DDE, well below the FAO/WHO acceptable daily intake of organochlorine insecticides (18  $\mu$ g/kg body wt.). [From En summ.] LH

## 151

**[Use of the Most Probable Number technique for quantitative detection of salmonellae. III.**

**Quantitative determination of salmonellae in drip water of frozen broilers and chicken breast fillets.]**

Einsatz der Most Probable Number-Technik zum quantitativen Salmonellen-Nachweis. III. Quantitative Bestimmung von Salmonellen im Aufbauwasser gefrorener Brathähnchen und Hähnchenbrustfilets.

Siems, H.; Hildebrandt, G.; Arndt, G.; Weiss, H. *Fleischwirtschaft* 61 (11) 1741-1745 (1981) [31 ref. De, en] [Freie Univ. Berlin, D-1000 Berlin 33]

The Most Probable Number (MPN) technique was used to determine the number of salmonellae in drip water and incubated pre-enrichment medium from 480 samples of frozen chickens (330 broilers and 150 breast fillets), using 3 tubes of sample material at 3 dilution levels, buffered peptone water for pre-enrichment and tetrathionate for selective enrichment. Salmonellae were isolated from 107 (32.4%) and 48 (32%) samples of drip water from broilers and breast fillets resp., at 0.06 to 3.0 cells/ml. Most of the values were at the lower end of the range. While 18 h incubation of the defrosted samples increased the number of positive results, the number of salmonellae/ml in the pre-enrichment medium did not differ greatly from the results obtained from drip water. The MPN detn. is subject to a marked error due to the low concn. of salmonellae. Nevertheless the technique is suitable for control of hygienic conditions, especially for routine control of frozen poultry where evaluation of the concn. of salmonellae/ml drip water is preferable to the presence-absence test [See preceding abst. for part II.][From En summ.] RM

## 152

[Influence of floor space in cage on viscoelastic properties of chicken meat.]

Watanabe, Y.

*Japanese Journal of Zootechnical Science [Nihon Chikusan Gakkai-ho]* 52 (9) 646-652 (1981) [21 ref. Ja, en] [Aizu Junior Coll. of Fukushima Prefecture, Aizuwakamatsu-shi 965, Japan]

20 female Cornish x White Rock F<sub>1</sub> crossbred chickens were used in a study on effect of housing conditions (i) 1 bird/cage, floor space 1800 cm<sup>2</sup>/bird, (ii) 2 birds/cage, floor space 1800 cm<sup>2</sup>/bird, or (iii) 20 birds/cage, floor space 2135 cm<sup>2</sup>/bird, on the viscoelastic properties of the meat. The chickens were held under these conditions from 5 to 20 wk of age, after which they were slaughtered. Samples of *pectoralis superficialis* and *iliotibialis* muscles were taken, and sections 50 mm long, 20 mm wide and 1-4 mm thick were cut so that the long axis was parallel to the direction of the muscle fibres. Dumbell-shaped pieces were stamped out of these strips, and stress relaxation measurements were conducted using a Chainomatic Balance Food Rheometer, samples being stretched 13.5 mm at 2.8 mm/s, and held for 5 min at 50% RH at 30°C. Tables of results are given. The  $\tau$  value of breast meat was smaller for (iii) than for (i) or (ii) birds. The S/f<sub>0</sub> value of thigh meat was higher for (iii) than for (ii). F max and  $\tau$  values were higher for thigh than for breast meat. These results are discussed in relation to texture (toughness and elasticity) of the meat. [From En summ.] AJDW

## 153

Incidence of *Campylobacter jejuni* in fresh eviscerated whole market chickens.

Park, C. E.; Stankiewicz, Z. K.; Lovett, J.; Hunt, J.

*Canadian Journal of Microbiology* 27 (8) 841-842 (1981) [15 ref. En, fr] [Bureau of Microbial Hazards, Food Directorate, Health Protection Branch, Health & Welfare Canada, Ottawa, Ontario, Canada K1A 0L2]

Over a period of 5 wk, 50 fresh eviscerated whole chickens were obtained in Ontario, Canada, and 50 from Ohio, USA (10 different stores in each location). Each chicken was sampled by washing and massaging with 250 ml nutrient broth in a plastics bag. The broth was filtered through cheesecloth and centrifuged at 16 300 g<sub>n</sub> for 15 min, the sediment was suspended in brucella broth and the suspension was transferred to an enrichment broth for incubation at 37°C for 3 days before plating on selective agars. The enrichment broth is known to detect 0.2 cells *C. jejuni*/g in the presence of 10<sup>4</sup>-10<sup>6</sup> other organisms/g. *C. jejuni* was isolated from 31 of the 50 Ontario chickens and 27 of the 50 Ohio chickens. Without the enrichment procedure, direct isolation showed only 16 campylobacter-positive Ontario chickens. This indicated that about half of the contaminated Ontario chickens contained >10<sup>2</sup> cells/bird. There were no significant differences between food stores. Public health significance of extensive contamination of fresh market chickens with *C. jejuni* remains to be established. DIH

## 154

Thermal inactivation of *Clostridium perfringens* enterotoxin in buffer and in chicken gravy.

Bradshaw, J. G.; Stelma, G. N.; Jones, V. I.; Peeler, J. T.; Wimsatt, J. C.; Corwin, J. J.; Twedt, R. M.

*Journal of Food Science* 47 (3) 914-916 (1982) [En] [Food & Drug Administration, 1090 Tusculum Avenue, Cincinnati, Ohio 45226, USA]

Time-temp. relationships for inactivation of purified enterotoxin prepared from *C. perfringens* were determined by Vero cell assay in 3 different heating menstrua. Enterotoxin diluted to an initial concn. of 12.5 µg/g in chicken gravy and in 0.1M phosphate buffer, both at pH 6.1, was heated at temp. of 59-65°C. Average inactivation times in gravy ranged from 1.5 to 72.8 min and in buffer from 2.4 to 149.4 min. IFT

## 155

Tissue residues of arprinocid in chickens. I. Depletion of residues in tissues of chickens fed carbon-14-labeled arprinocid.

Jacob, T. A.; Alvaro, R. F.; Chapin, L. R.; Green, M. L.; Meriwether, H. T.; Olson, G.; Iderstine, A. A. van; Wolf, F. J.

*Journal of Agricultural and Food Chemistry* 30 (2) 248-253 (1982) [7 ref. En] [Merck Sharp & Dohme Res. Lab., Rahway, New Jersey 07065, USA]

Chickens were fed diets containing 60-80 p.p.m. of the anticoccidial agent arprinocid starting at 3-9 days of age and ending at 49-60 days of age. In these experiments the chickens were fed [<sup>14</sup>C]-labelled drug during the last 4 or 14 days or the total 44 days of the dosing. Of the edible tissues, liver retained the largest radioactive residue after withdrawal of drug from the

diet. These residues consisted of 2 pools, a rapidly depleting pool and a persistent, slowly depleting pool. The persistent pool represents about 15% of the total residue at drug withdrawal and about 100% of the residue 5 days after drug withdrawal. The results of the 4-day pulse were used to estimate the steady-state level of residues due to the persistent pool. The estimated value was in good agreement with that found on lifetime exposure to radioactive drug. AS

## 156

**Tissue residues of arprinocid in chickens. II. A common derivative approach for the analysis of residues in liver.**

Carlin, J. R.; Rosegay, A.; Wolf, F. J.; Jacob, T. A. *Journal of Agricultural and Food Chemistry* 30 (2) 253-257 (1982) [11 ref. En] [Merck Sharp & Dohme Res. Lab., Rahway, New Jersey 07065, USA]

Residue analysis of tissues taken from chickens administered [<sup>14</sup>C]-labelled arprinocid [9-[(2-chloro-6-fluorophenyl)methyl]-9H-purin-6-amine] showed that liver is the edible tissue containing the highest level of radioactivity after drug withdrawal. <10% of this residue was assayed as either unchanged drug or known metabolites. Solvent extractions carried out by using homogenates of liver samples taken from birds on drug through 5 days after drug withdrawal showed that most of the radioactivity could not be separated from the insoluble fraction. Strong acid hydrolysis converted 74-88% of the respective residues to a readily extractable compound identified as 2-chloro-6-fluorobenzylamine. Through analysis of this amine, both drug and unknown (but drug-related) metabolites can be quantitated-regardless of whether the residue is solvent extractable or covalently bound to cellular macromolecules. Direct assay of the free base 2-chloro-6-fluorobenzylamine has serious limitations; however, the dansyl derivative proved to be an ideal compound and serves as the basis of the analytical assay of arprinocid-derived residues. [See preceding abstr. for part I.] AS

## 157

**[Detectability of chicken separated material in Brühwurst.] Nachweisbarkeit von Hühnerseparatorenmaterial in Brühwurst.**

Psota, A.; Merkl, H.; Ausserlechner, G.

*Ernährung* 6 (2) 74-75 (1982) [De]

**[Lebensmitteluntersuchungsanstalt der Stadt Wien, Viehmarktgasse 1, A-1030 Vienna, Austria]**

Trials were performed on the detection of chicken separator material [CSM] added to Feine Extrawurst sausage. The sausage recipe comprised 70 parts comminuted beef, 5 parts CSM and 25 parts Speck; results of organoleptic, chemical and histological analyses are given for CSM and the sausage heated to a core temp. of 72° and 80°C, together with serological

results (radial double diffusion and immuno-electrophoresis) for the sausages. The success of histological analysis depended on CSM composition, whereas serological analysis detected CSM even at 80°C core temp. of the sausage. It is concluded that serological analysis confirmed by histological analysis can detect small quantities of CSM in Brähwurst at high temp. RAW

## 158

**[Studies on residues of synthetic antibacterial agents in livestock products. I. HPLC method for 3,5-dichloro-2,6-dimethyl-4-pyrinidol(clopidol).]**  
Murata, H.; Fukushima, S.; Miyata, H.; Kashimoto, T. *Proceedings of Osaka Prefectural Institute of Public Health, Food Sanitation [Osaka-furitsu Koshu Eisei kenkyusho Kenkyu Hokoku, Shokuhin Eisei Hen]* 11, 3-5 (1980) [2 ref. Ja]

The method involves homogenizing samples in methanol with high flow Supercell; filtering; purification on a basic alumina column, a negative ion exchange column and an alumina column, before estimation of clopidol using HPLC on a Lichrosorb Si 60 column eluted with methanol at 1 x 2 ml/min, and detection at 268 nm. Absorbance peak height was linearly related to the amount of clopidol between 5 and 200 ng. Recovery of clopidol added at 5 µg/10 g to eggs and chicken tissue was 86-96% (5 replicates of each). No clopidol was detected in 5 samples of eggs and 5 of chicken from retail outlets. CIH

## 159

**The composition of the broiler chicken at 56 days of age: output, components and chemical composition.**

Broadbent, L. A.; Wilson, B. J.; Fisher, C. *British Poultry Science* 22 (4) 385-390 (1981) [3 ref. En] [Agric. Res. Council's Poultry Res. Cent., Roslin, Midlothian EH25 9PS, UK]

24 broilers of each sex were slaughtered at 56 days of age, eviscerated, and dissected to ascertain yield and composition. Data are presented for total carcass yield, yield of individual carcass parts for each sex, and proximate analysis (fat, protein and moisture) for the components of the carcasses, i.e. bone, meat, skin, and gullet fractions. JRR

## 160

**Yields and composition of edible and inedible by-products of broilers processed at 6, 7, and 8 weeks of age.**

Crawley, S. W.; Sloan, D. R.; Hale, K. K., Jr. *Poultry Science* 59 (10) 2243-2246 (1980) [8 ref. En] [Dep. of Poultry Sci., Clemson Univ., Clemson, S. Carolina 29631, USA]

A total of 360 broilers (120 slaughtered at each of the ages 6, 7 and 9 wk) were used in a study on yield and composition of slaughter by-products. Data are given for yield of blood, feathers, feet, head, viscera, gizzard, neck, heart and liver, as % of live wt, and for the % moisture, protein and fat in these products. The %

gizzard and neck decreased, % liver increased and % heart was approx. constant over the live wt. range studied. In most of the by-products studied, moisture content decreased and lipid content increased with increasing bird age, while protein content varied little with age. AJDW

## 161

[**Poultry meat hygiene: importance of live inspection of the flocks.**] Geflügelfleischhygiene: Bedeutung der Lebenduntersuchung im Herkunftsbestand.

Siegmund, O.

*Archiv für Lebensmittelhygiene* 32 (5) 159-160 (1981)  
[De, en] [Tierärztliche Hochschule, 3000 Hannover 31, Federal Republic of Germany]

The importance of current regulations on poultry meat inspection is surveyed. Extended ante-mortem examination of chicken flocks is recommended. RM

## 162

[**Diagnosis of poultry diseases specified in the poultry meat inspection order - a critical commentary.**] Diagnostik der in der Geflügelfleischuntersuchungs-Verordnung angesprochenen Krankheiten - ein kritischer Kommentar.

Neumann, U.

*Archiv für Lebensmittelhygiene* 32 (5) 160-161 (1981)  
[De, en] [Tierärztliche Hochschule, 3000 Hannover 31, Federal Republic of Germany]

The shortcomings of current regulations on poultry meat inspection are critically examined. Extended ante-mortem control of chicken flocks is recommended. RM

## 163

**Influences of diet on chick body composition.**

Combs, G. F., Jr.

*Feedstuffs* 54 (22) 20, 28 (1982) [7 ref. En] [Cornell Univ., Ithaca, New York, USA]

The effects of N supplements in finishing diets on carcass characteristics of broilers were studied; N supplements evaluated were diammonium citrate, diammonium phosphate, ammonium polyphosphate, ammonium sulphate, feather meal and urea. Data are given for gain, feed/gain ratio, ready-to-cook wt., water, ash, crude protein, and fat contents of the carcass, and abdominal and gizzard fat %. Results were variable; in one trial, addition of ammonium polyphosphate, ammonium sulphate or feather meal decreased fat % and abdominal fat wt. Both non-protein N sources reduced gain; this effect was less for ammonium polyphosphate than for ammonium sulphate, the former giving dressed wt. and ready-to-cook wt. little different to controls. Data are also given for the carcass composition of untreated broilers of 5 strains. AJDW

## 164

**Nutritive value and quality of oat groats for broiler chickens.**

Hulan, H. W.; Proudfoot, F. G.; Zarkadas, C. G.  
*Canadian Journal of Animal Science* 61 (4) 1013-1021 (1981) [19 ref. En, fr] [Agric. Canada, Res. Cent., Kentville, Nova Scotia B4N 1J5, Canada]

4 experiments were carried out to establish the suitability of oat groats (Eastern and Western) for partially replacing corn or totally replacing wheat in starter and finisher diets for Cobb broilers. Tables of results include the % of carcasses of grade A, and indicate that feeding up to 600 g oat groats/kg in starter diets and 800 g/kg in finisher diets had no significant adverse effect on performance of broilers. LH

## 165

**Standard for chickens, eviscerated, and chicken parts.**

Canada, Canadian Government Specifications Board  
*Canadian Government Specifications Board Standard* CGSB 32-GP-181M, 6pp. (1981) [En, Fr]

This standard, which supersedes 32-GP-181c (1971), applies to ready-to-cook chickens, chicken capons and chicken parts. It deals with chickens and parts supplied in the following 3 types (chilled to 2°C, chilled to -2°C, and frozen), 4 grades (Canada grades A, B, utility, and C), 11 classes (whole chickens and capons, half and quarter fryer chickens, half breasts, half trimmed breasts, drumsticks, thighs, legs, wings and livers), and 2 styles (raw and cooked breaded). It covers general requirements, refrigeration requirements, delivery condition, preparation for different classes, packaging and marketing. AL

## 166

[**Refrigeration of broiler carcasses. III. Effect on overall quality and moisture content of the meat.**]

Cotta, J. T. de B.; Campos, E. J.

*Arquivos da Escola de Veterinaria da Universidade Federal de Minas Gerais* 33 (3) 471-475 (1981) [7 ref. Pt, en] [Inst. de Zootecnia, Univ. Fed. Rural, Rio de Janeiro, Brazil]

Studies were conducted on 16 broiler carcasses preserved by 4 methods: (i) freezing at -30°C followed by storage at -7°C; (ii) storage in ice at -2°C; (iii) packaging in a CO<sub>2</sub> atm in plastics bags and storage at -2°C; and (iv) packaging and cold storage at -2°C. Quality was evaluated after storage for 5 or 12 days. No significant effects of the storage methods studied on general sensory quality scores or on moisture content were observed. [See FSTA (1982) 14 1S65 for part II.] AJDW

## 167

**The response of male broilers to varying levels of dietary protein and energy.**

Jackson, S.; Summers, J. D.; Leeson, S.

*Nutrition Reports International* 25 (4) 601-612 (1982) [18 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario N1G 2W1, Canada]

Day-old male broilers were split up into groups of 10, and fed 12 ad lib. diets of various composition in a factorial design, for 49 days with conventional brooding and rearing practices being used. Diets encompassed 4 crude protein (CP) levels of 20, 24, 28 or 32%, and 3 metabolizable energy (ME) levels of 3000, 3200 or 3400 kcal/kg. Carcass traits and composition were studied after slaughter. Carcass fat (%) was 47.0, 40.8, 39.5 and 37.3 in the 20-32% CP diets, resp.; levels for the 3000-3400 kcal/kg ME diets were 38.6, 42.0 and 42.8. Corresponding results for carcass protein % were 48.8,

50.8, 52.4, 54.1, 53.1, 52.3 and 49.2; carcass moisture gave values of (%) 64.1, 66.4, 66.7, 68.1, 67.2, 66.2, 65.6; abdominal fat % was 3.87, 2.83, 2.45, 1.96, 2.28, 2.80 and 3.26. Absolute values for these parameters are also tabulated. LH

## 168

**Contamination of broiler chickens by *Staphylococcus aureus* during processing; incidence and origin.**

Notermans, S.; Dufrenne, J.; Leeuwen, W. J. van  
*Journal of Applied Bacteriology* 52 (2) 275-280 (1982)  
[9 ref. En][Lab. for Zoonoses & Food Microbiol., Nat. Inst. of Public Health, PO Box 1, 3720 BA Bilthoven, Netherlands]

*Staphylococcus aureus* was present in only small numbers (approx. 10/g) on the skin of broiler chickens before processing. During processing, contamination of carcasses with this organism increased to  $> 10^3$ /g of skin. Based on the results of phage typing, it was shown that the increase in contamination was due to a strain of *Staph. aureus* which was indigenous to the processing plant. Plucking and evisceration appeared to be the main stages at which contamination of carcasses with *Staph. aureus* occurred. AS

## 169

**Improved cooking method and apparatus.**

Maxton, K. S. (ABR Food Machinery Co.)  
*British Patent* 1 603 617 (1981) [En]

Process is described in which food items, e.g. chicken pieces, are conveyed through a tank of heated cooking oil while being subjected to microwave radiation. The microwave speeds up the cooking process and allows  $> 1/2$  the total energy requirement to be in a cheap form, e.g. gas. RAW

## 170

**[Nutritive, biological and energetic value of hens' meat.]** (In 'Problemy kachestva i biologicheskoi tsennosti pishchevykh produktov' [see FSTA (1982) 14 11G722].)

Pugachev, P. I.  
pp. 201-209 (1979) [Ru][Leningradskii Inst. Sovetskoi Torgovli im. F. Engel'sa, Leningrad, USSR]  
(i) breast (white) and (ii) leg (dark) muscles were separated from carcasses of well-fed (1st category) hens (no other details given). Analytical data included for (i) and (ii) resp.: moisture, 74.6 and 73.3%; fat, 2.5 and 5.8%; ash, 1.2 and 1.3%; and protein, 21.7 and 19.6%. Contents of constituent amino acids (15 named, and unidentified totalling resp. 9.4 and 3.0% of the protein) determined by amino acid analyser are tabulated for (i) and (ii). The values found are discussed and assessed against the background of amino acid scores recommended by FAO/WHO and of their recommended nutrient allowances for man. It is

concluded that hens' meat is of high biological value exceeding in amino acid composition the hypothetical FAO/WHO standard protein, and that (i) is higher than (ii) in biological and nutritive value, but contains less calories. SKK

## 171

**[Studies on the variation of abdominal fat deposition by various mating systems in broiler chicks.]**

Suk, Y. O.; Kim, W. K.

*Korean Journal of Animal Science [Hanguk Ch'uksan Hakhoe Chi]* 24 (1) 1-9 (1982) [20 ref. Ko, en][Coll. of Agric., Korea Univ., Seoul, S. Korea]

(i) Cornish (C), (ii) White Plymouth Rock (WPR), (iii) C x WPR, and (iv) WPR x C broilers were fed identical starter (0-4 wk) and finisher (5-8 wk) diets, and levels of abdominal fat in the carcasses were measured. (i)-(iv) contained (as % of body wt) 3.24, 2.98, 3.15 and 3.31 abdominal fat, resp., females accumulating more than males, and older birds more than younger ones.  
[From En summ.] LH

## 172

**A comparison of the effects of different nutritional factors on the carcass composition of three broiler strains at two ages.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052].) [Lecture]

Have, H. G. M. ten; Scheele, C. W.  
pp. 386-396 (1981) [21 ref. En][Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

1080 day-old chickens of 3 commercial broiler strains were used in a study on effects of diets differing in metabolizable energy (12.0-15.1 MJ/kg DM), fat (3.17-9.58%), lysine (0.78-1.14%) and crude fibre (1.68-6.07%) contents on carcass composition. Broilers were slaughtered at 6 or 8 wk of age. Data are given for fat and protein contents of the carcasses of the broilers. Dietary factors and age significantly influenced fat and protein contents of the carcass; significant interactions between dietary variables were observed. Protein deposition was more markedly influenced by dietary factors than fat deposition; protein deposition was mainly influenced by dietary lysine level, fat deposition by dietary fat level. AJDW

## 173

**Shelf life of frozen broiler parts.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052].) [Lecture]

Bolder, N. M.; Germs, A. C.; Mulder, R. W. A. W.  
pp. 473-479 (1981) [10 ref. En][Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

Carcasses of broilers of a Hybro white-skinned strain were used in a study on changes in frozen whole carcasses and packaged legs during storage at  $-12^{\circ}$  and  $-18^{\circ}$ C for  $\leq 9$  months; whole carcasses were also stored at  $-75^{\circ}$ C, as reference samples. Changes in wt, colour, pH, TBA value, peroxide value, free fatty acids concn., and microbiological quality were evaluated. Chicken legs showed no wt. loss during storage, although water migration (ice formation) occurred in the pack. Lipid oxidation was greater for legs than for whole carcasses. No significant effects on colour

measurements were observed. Free fatty acid concn. increased for the first 3 months, after which little further change occurred; free fatty acid concn. were lower for legs than for whole carcasses. Total count and Enterobacteriaceae count decreased during frozen storage; no effect of frozen storage on the % *Salmonella*-positive samples was observed. Yeast + moulds count remained constant at  $-18^{\circ}\text{C}$ , but decreased at  $-12^{\circ}$  or  $-75^{\circ}\text{C}$ . AJDW

## 174

[Effect of cooling process on meat quality of broiler cuts.] Einfluss des Kühlverfahrens auf die Fleischbeschaffenheit der Teilstücke bei Broilern.

Ristic, M.

*Fleischerei* 33 (3) 178-180 (1982) [5 ref. De]

[Bundesanstalt für Fleischforschung, E.-C.-Baumann-Strasse 20, D-8650 Kulmbach, Federal Republic of Germany]

Carcasses of 1600 6-wk-old broilers were used in a study on effects of initial cooling method (air or water cooling), subsequent fresh storage time (1-8 days) and frozen storage temp. ( $-15^{\circ}$  or  $-21^{\circ}\text{C}$ ) on quality. Characteristics studied included aroma, overall organoleptic quality, cooking loss, freezer burn, drip %, peroxide value, total count and instrumentally measured tenderness. These variables were evaluated for thigh and breast muscle of broilers cold stored for  $\leq 20$  months. Storage life was shorter for thigh than for breast meat, drying-out rancidity development and aroma loss being more rapid in the former. Storage temp. had little effect on quality. Water-cooling gave better aroma than air-cooling. Storage of the fresh carcasses for 6 days gave the best sensory scores of the thigh. Tenderness of thigh meat was best with long storage of the fresh carcass, and subsequent storage at  $-21^{\circ}\text{C}$ . Results for breast muscle show that air cooling and storage at  $-15^{\circ}\text{C}$  increased freezer burn. Drip loss was lower for air cooling; storage at  $-15^{\circ}\text{C}$  gave the least drip. Peroxide values increased with increasing storage times; they were generally lower for air-cooled than for water-cooled broilers. Fresh storage for only 1 day and air cooling gave the lowest bacterial count. Water cooling and the higher storage temp. improved aroma; prolonged storage impaired aroma. Breast muscle from air-cooled carcasses showed better tenderness than that from water-cooled carcasses. AJDW

## 175

Influence of water cooling of fresh broilers on the shelf life of poultry parts at  $-15^{\circ}$  and  $-21^{\circ}\text{C}$ . (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Ristic, M.

pp. 466-472 (1981) [4 ref. En] [Fed. Inst. of Meat Res., E. C. Baumannstrasse 20, D-8650 Kulmbach, Federal Republic of Germany]

640 Lohmann broiler carcasses were used in a study on effects of storage of the carcass at  $0.4^{\circ}\text{C}$  (for 1, 3, 6 or 8 days) before cutting on subsequent storage life of the

frozen poultry parts at  $-15^{\circ}$  or  $-21^{\circ}\text{C}$ . The cuts were stored for  $\leq 16$  months; at 2-month intervals they were assessed for freezer burn, % drip, pH, colour lightness, rigor/consistency value, meat colour, sensory quality, objective tenderness, % grilling loss, peroxide value and total bacterial count. Tables of results are given, and discussed in detail. Keeping quality of leg muscle was inferior to that of breast muscle, as a result of the higher fat content and consequent susceptibility to rancidity. It is concluded that fresh broilers from which frozen cuts are to be produced should be stored for not more than 3-6 days at approx.  $0^{\circ}\text{C}$ . AJDW

## 176

The effect of slaughter procedures on the contamination of broiler chickens with

*Staphylococcus aureus*. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Notermans, S.; Leeuwen, W. J. van

pp. 434-439 (1981) [6 ref. En] [Nat. Inst. of Public Health, PO Box 1, 3720 BA, Bilthoven, Netherlands]

Studies were conducted at 2 plants, (i) producing 5300 frozen broilers/h, and (ii) producing 9000 fresh broilers/h. Enterobacteriaceae counts and *Staphylococcus aureus* counts were determined at various stages of processing (before scalding, after scalding, after defeathering, after opening, after removal of organs, and after cleaning and cooling). Graphs of results are given. Counts of *S. aureus* were initially low, but increased subsequently, especially after opening in (i) and after defeathering in (ii). After this increase, the *S. aureus* count underwent little further change. Counts of  $10^3$ - $10^4$ /g skin were recorded. Scald water had counts of  $<1$ - $10$ /ml; discharged spinchiller water had counts of 20-80 ml. Phage types dominating after scalding could not be detected on the carcasses before scalding. No *S. aureus* was detectable in the intestinal tracts of the chickens before processing. It is concluded that carcasses are contaminated with *S. aureus* indigenous to the plant; the defeathering machine may be the site of a build-up of *S. aureus*. AJDW

## 177

Abdominal and total fat content of three broiler strains at two ages affected by nutritional factors. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Scheele, C. W.; Schagen, P. J. W. van; Have, H. G. M. ten pp. 397-407 (1981) [20 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

1080 day-old chicks of 3 commercial broiler strains were fed diets differing in metabolizable energy (12.0-15.1 MJ/kg), fat (2.1-6.3%), lysine (0.61-0.83%) and crude fibre (1.7-6.1%) up to slaughter at 6 or 8 wk of age. Effects on abdominal fat and other contents of the carcass evaluated. Tables and graphs of results are given. At 6 wk of age, dietary fibre and metabolizable energy levels had a major effect on abdominal fat; at 8 wk of age, dietary fat content was the major factor influencing abdominal fat; dietary lysine also markedly influenced the abdominal fat content of the carcass, but

metabolizable energy had little effect. Strains differed in response to the variables studied. It was not found possible to predict broiler carcass composition solely on the basis of dietary protein and energy contents.

AJDW

## 178

**The effect of different bird washers on the microbiological quality of broiler carcasses.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Mulder, R. W. A. W.; Bolder, N. M.

pp. 306-313 (1981) [11 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA BEEKBERGEN, Netherlands]

Comparative studies were conducted at 13 poultry slaughterhouses to evaluate effects of (i) spray washers and (ii) inside-and-outside washers on the microbiological quality of broiler carcasses. Total counts and Enterobacteriaceae counts of the carcasses before and after washing in (i) and (ii) were determined; tables of results are given. Overall, (ii) gave results no better than (i). With both methods, cleaning efficiency tended to increase with increasing water vol. used; however, the high water consumption (1.5 l/carcass) mandatory under EEC regulations is unnecessary.

AJDW

## 179

**Quality comparison of fresh versus frozen chicken.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Aström, S.; Qvist, I.

pp. 266-275 (1981) [9 ref. En] [Frigoscandia AB, Helsingborg, Sweden]

Comparative studies were conducted on the quality of fresh and frozen chickens. Frozen chickens prepared with scalding at 52°C vs. 59°C, and with or without ageing before freezing, were evaluated. Sensory quality was evaluated by triangle tests. The results are presented as graphs. The results showed little difference between samples when only 1 factor was varied; a small but significant difference was observed between samples in which all 3 factors (freezing, scalding, ageing) differed. It is concluded that quality differences between fresh and frozen chickens may be minimized by correct processing. AJDW

## 180

**Relationship between sexual maturity and meat quality in chickens.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Touraille, C.; Ricard, F. H.

pp. 259-265 (1981) [4 ref. En] [Stat. de Recherches sur la Viande, INRA, Theix, 63110 Beaumont, France]

Comparative studies were conducted on the quality of meat from 2 groups of cockerels, (i) with high testis wt. and (ii) with low testis wt. (as an indication of sexual

maturity). Tables of data are given for live wt., carcass wt., comb length, abdominal fat wt., testes wt., cooking loss, and sensory properties (tenderness, juiciness, flavour intensity, overall preference) for thigh, breast and total meat. Significant differences between (i) and (ii) were observed only for sensory quality: (i) (i.e. more mature birds) had tougher but more flavourful meat, which was generally preferred. AJDW

## 181

**Consumer tests of breast meat from two types of broilers.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Vries, A. W. de

pp. 254-258 (1981) [4 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA BEEKBERGEN, Netherlands]

Comparative consumer acceptability trials were conducted on breasts of chickens of 2 types: (i) French samples from 11-wk old free-range chickens fed a relatively cereal-rich diet, and (ii) Dutch samples from 7-wk old battery chickens fed a high-energy diet. The consumer tests were conducted in Rotterdam, Utrecht and Berlin. Overall, (ii) were preferred by 61.0% of respondents. (i) samples were less tender, less juicy but more flavourful, which is consistent with the age difference. Possible causes of variation in results of trials at the 3 locations are briefly considered. AJDW

## 182

**A comparative study on *Salmonella* isolation methods for broiler carcasses.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Mulder, R. W. A. W.

pp. 213-219 (1981) [4 ref. En] [Spelderholt Inst. for Poultry Res., Min. of Agric. & Fisheries, 7361 DA, BEEKBERGEN, Netherlands]

60 eviscerated broiler carcasses from a *Salmonella*-positive flock (20 examined before freezing, 20 after freezing and 20 after freezing + irradiation) were used in a study on methods for detn. of salmonellae. 2 resuscitation media, 2 pre-enrichment media, 5 selective enrichment media and 10 selective agar media were evaluated. Tables of results are given. It is concluded that pre-enrichment in buffered peptone water, enrichment in selenite cystine broth and plating on sulphapyridine brilliant green agar gives the best results. Bismuth sulphite agar and mannitol selenite cystine broth were unsuitable for isolation of salmonellae from the type of material under investigation. AJDW

## 183

**A miniaturized method used for the numeration of bacteria from poultry carcasses.** (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Colin, P.; Lahellec, C.

pp. 201-204 (1981) [3 ref. En] [Min. de l'Agric., Sta. Exp. d'Aviculture, BP 9, 22440 Ploufragan, France]

50 air-chilled chicken carcasses were used in a comparative study on (i) standard and (ii) miniaturized methods for detn. of bacteria in poultry carcasses. For

both methods, a 5-g neck skin sample was taken, and blended for 2 min in a Stomacher. For (i), 1:10 dilutions were prepared in tubes containing 9 ml of a tryptone/NaCl/water diluent, the dilutions then being plated. For (ii) 1:10 dilutions were prepared in the wells of a microtitration plate, each well containing 225 µl of the above diluent. 1 drop (25 µl) of each dilution was plated. Media and incubation conditions were identical for the 2 methods. Tables of results are given. The results show data determined by (i) and (ii) to agree closely; correlations were highly significant. Method (ii) is appreciably quicker than method (i). AJDW

## 184

**Problems associated with the application of Council Regulation EEC2967/76 to chickens processed under commercial conditions in the United Kingdom. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]**

Thomas, N. L.

pp. 181-189 (1981) [1 ref. En] [Buxted Poultry Lab., Worstead, North Walsham, Norfolk, NR28 9SA, UK]

Possible problems with application of the test methods of Council Regulation EEC2967/76 are considered; trials were conducted on application of these methods to chickens processed at 3 plants in the UK. Tables of results are given. Overall, it is concluded that the Annex I test gives a good estimate of true average wt gain of the carcass during washing and chilling. Eviscerated wt was inversely related to % water pickup during post-evisceration spray washing and chilling. The Annex II drip test did not give a consistent estimate of the additional water content resulting from washing and chilling. Probability of passing the annex (III) test is influenced by average protein content, average carcass wt and presence or absence of offal. Practical implications of these results are discussed. AJDW

## 185

**Influence of transport-time on yield of broilers. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]**

Jensen, O.

pp. 38-43 (1981) [6 ref. En] [Nat. Inst. of Anim. Sci., Copenhagen, Denmark]

A total of 640 White Plymouth Rock chickens was used in a study on effects of transport time (1-13 h) on carcass yield and eviscerated wt, and wt and % of neck, wings, breast fillets, skin, legs, skeleton, heart, gizzard, liver, heart and inedible viscera. Tables of results are given. Difference between live and dead wt increased with increasing transport time; the other characteristics studied were not significantly affected by transport time. AJDW

## 186

**The influence of age, sex and strain on yield and cutting of broilers. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]**

Seemann, G.

pp. 21-27 (1981) [8 ref. En] [Lehrstuhl Kleintierzucht, Univ. Hohenheim, Stuttgart-Hohenheim, Federal Republic of Germany]

6000 broilers were used in a study on effects of slaughter age (5-6, 6-8 or 8-11 wk), sex (male vs. female) and strain (3 commercial strains) on carcass yield and cutting data. Tables of results are given. Slaughter yield was highest for males, and increased with slaughter age; it differed significantly between strains. The % breast and breast meat increased whereas % wing and back decreased with increasing age. Females had higher % back and breast but lower % thigh than males; no significant effect of sex on breast meat % was observed. Broiler strain significantly affected % back, wings, thigh, breast and breast meat. Implications for fattening periods for broilers are briefly considered. AJDW

## 187

**The influence of age at slaughter and the composition of diet on yields of slaughter chickens. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]**

Jensen, J. F.

pp. 14-20 (1981) [7 ref. En] [Inst. of Anim. Sci., Rolighedsvej 25, 1958 Copenhagen V, Denmark]

Experiments were conducted to evaluate effects of diet (20% maize:40% barley, 40% maize:20% barley, or total replacement of maize by oats of 3 var.) and age at slaughter (43, 56 or 65 days) on slaughter yield and eviscerated yield of broilers. Tables of results are given. The results show that slaughter yield and eviscerated yield (expressed as %) increase with increasing slaughter wt.; these yields were slightly lower for broilers fed oat diets than for those on a maize diet. The 2 barley/maize ratios had little effect on slaughter or eviscerated yield. Age (but not diet) influenced % breast, thigh and drumsticks; neither slaughter diet nor age had a major effect on chemical composition of the carcass. AJDW

## 188

**Preparation of useful by-products from cooked fowl frames. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]**

Veerkamp, C. H.; Elsinga, W.

pp. 80-87 (1981) [8 ref. En] [Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

Utilization of slaughtered spent laying hens can be enhanced by the production of by-products such as mechanically deboned meat (MDP), rendered fat and pet-food. Yields of 75% MDP were achieved with a Protecon deboning machine; the bone content of this meat was 0.5%. Fat was separated from the cooked fowl frames with a Sharples decanter. About 85% of the total amount of fat was obtained at 70°C in the liquid discharge of the decanter. AS

## 189

Weight composition of chicken broiler and spent hen carcasses. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Uijttenboogaart, T. G.

pp. 44-53 (1981) [8 ref. En] [Min. of Agric. & Fisheries, Spelderholt Inst. for Poultry Res., 7361 DA Beekbergen, Netherlands]

Studies were conducted on the % of various cuts and organs in 72 broiler carcasses (of 4 breeds) and 77 spent hen carcasses (of 5 breeds). The dissection method used is described in detail. Tables of results are given. Results for broilers show little difference in carcass composition between breeds, but significant differences between wt. groups were observed. Considerable differences were observed between spent hen breeds; some of these may, however, be related to carcass wt. differences. The dissection method used is concluded to be very accurate, although time consuming. AJDW

## 190

Effect of method of freezing, processing and packaging variables on microbiological and other quality characteristics of beef and poultry.

Reddy, K. V.

*Dissertation Abstracts International, B* 42 (4) 1378: Order no. 8122557, 196pp. (1981) [En] [Iowa State Univ., Ames, Iowa 50010, USA]

Studies of the effects of combining fresh and frozen beef in different proportions indicated that a 50:50 ratio of fresh:frozen produced higher bacterial numbers than when other proportions were combined and held in frozen storage. No health hazard was evident from any fresh:frozen ratios or from freezing in liquid N<sub>2</sub> or liquid CO<sub>2</sub> and frozen storage. Studies of the bacterial flora indicated that the *Moraxella-Acinetobacter* group increased considerably (as % of total isolates) after freezing but declined during frozen storage; a concomitant increase occurred in the *Pseudomonas* group during frozen storage. Lipolysis of beef fat and proteolysis became more pronounced after frozen storage. Studies with chickens showed that a high barrier (vacuum pack) packaging material provided greatest restriction of bacterial multiplication during storage. Cut-up poultry spoiled faster than whole birds. Both cryogenic and conventional freezing methods produced an increase in the myofibril fragmentation index of turkey meat. Conventionally frozen turkey meat had higher fluid losses than meat frozen by liquid N<sub>2</sub>. JA

## 191

Meat, chicken cooking process promises economic, time savings.

Anon.

*Food Product Development* 15 (1) 42 (1981) [En]

A description is given of the Thermaljet process and its application to red meats, chicken and potentially to fish. The process employs hot water jets to cook the meat, and is quicker, and more energy-efficient than immersion techniques. Red meats, such as corned beef,

brisket and pastrami, are vacuum packed in plastics bags placed on wire racks between rotating sprayer arms in a specially designed cooker cabinet. Jets of water heated between 165° and 185°F impinge the meat. Temp. is maintained by continuously and immediately replacing cooled water with heated water. The hot water cooks the product in 1-2 h instead of 6-7 h by the immersion process. Poultry can be processed in the same unit but not at the same time as red meats. Up to 500 lb of raw chicken is injected with seasoning to about 120% original wt and then cooked back to 100% wt, with seasoning brine recirculated through a brine jet during cooking. At 205°F the chicken is cooked in 30 min. The chicken is claimed to be more tender and juicy and less greasy than regularly prepared chicken. VJG

## 192

Carcass quality of chickens as affected by environmental temperature and diet.

Hamdy, S.; Kosba, M. A.; Khalil, A. Z.; Abo-Egla, E. *Alexandria Journal of Agricultural Research* 28 (3) 39-48 (1980) [17 ref. En, ar] [Dep. of Anim. Production, Univ. of Alexandria, Alexandria, Egypt]

2 environmental temp. (75° and 100°F) and 3 different protein and mineral levels in the diet were incorporated in a factorial study of live body wt, blood loss, feather wt, giblet wt and eviscerated wt of chickens at slaughter at 16 wk of age. Live wt, eviscerated wt and blood loss % were all higher for birds kept at the lower temp., and giblet % was lower for the lower temp. Dietary factors did not affect blood loss or giblets %, but both dietary factors and temp. affected the eviscerated wt expressed as a proportion of live wt. JRR

## 193

Purine content of raw and roasted chicken broiler meat.

Young, L. L.

*Journal of Food Science* 47 (4) 1374-1375 (1982) [En] [USDA-ARS, Richard B. Russell Agric. Res. Cent., PO Box 5677, Athens, Georgia 30613, USA]

Adenine, guanine and hypoxanthine were determined in raw and roasted broiler parts. The levels of adenine and guanine increased slightly when the meat was cooked. These increases were attributed to moisture and fat losses by the tissues during roasting. The level of hypoxanthine remained constant or decreased in the tissues because some of the purine was removed with the cooking juices. The cooking juices were found to contain high levels of hypoxanthine and only trace amounts of adenine and guanine. IFT

## 194

*Campylobacter jejuni*: incidence in processed broilers and biotype distribution in human and broiler isolates.

Shanker, S.; Rosenfield, J. A.; Davey, G. R.; Sorrell, T. C. *Applied and Environmental Microbiology* 43 (5) 1219-1220 (1982) [18 ref. En] [Bact. Dep., Inst. of Clinical Path. & Med. Res., Westmead, NSW, Australia]

*Capylobacter jejuni* was isolated from 18 of 40 processed broiler carcasses and 134 of 327 cloacal swabs obtained at 4 processing plants in Sydney, Australia. 3 of 4 flocks examined carried *C. jejuni*. 82% of chicken and 98% of human isolates from the area were of identical biotypes. AS

## 195

[Feeding broiler chickens with high levels of acidulated safflower (*Carthamus tinctorius*) and fish soapstock. II. Effect on cold preservation of carcasses and their organoleptic quality.]

Camiruaga, M.; Vega, J. A. de la; Masson, L.; Burdiles, S. *Ciencia e Investigacion Agraria* 8 (3) 207-213 (1982) [13 ref. Es, en] [Dep. de Zootecnia, Univ. Catolica de Chile, Santiago, Chile]

Effect of feeding high levels of acidulated soapstock on preservation and organoleptic quality of broiler carcasses was studied. Samples (carcasses) were taken from different treatments: T<sub>1</sub> control diet without fat, T<sub>2</sub> diet with 15% safflower soapstock, and T<sub>3</sub> diet with 15% fish soapstock. Samples from each treatment were mechanically deboned, ground and analysed for fatty acids content and organoleptic stability. Another group of carcasses was refrigerated at 0°C and 84-85% RH for 7 days prior to analysis for fatty acids content and organoleptic qualities. Refrigeration did not produce any detectable change in the fatty acids composition of the carcass, but the thiobarbituric acid test revealed some fat oxidation. Treatments with 15% of either of the acidulated soapstocks received a higher organoleptic score than the control, indicating that the oxidation produced by refrigerated storage did not significantly affect organoleptic quality. Both test diets produced lower carcass pigmentation than the control diet. [See FSTA (1980) 12 S1097 for part I.] AS

## 196

[Contamination of foods with Pb and Cd. Analysis of meat products.]

Bolasco, A.; Memoli, A.; Botre, C.

*Rivista della Societa Italiana di Scienza dell'Alimentazione* 10 (3) 147-152 (1981) [20 ref. It, en] [Cattedra di Chimica Fisica, Univ. di Roma, Rome, Italy]

Data are presented for concn. of Pb and Cd (determined by AAS) in samples of beef muscle, spleen, kidneys and liver; veal muscle, spleen, kidneys, liver, heart, lungs, intestines and sweetbreads; chicken muscle and liver; turkey muscle; and pork muscle, spleen, liver, kidneys, raw ham and sausages. Max. Pb concn. recorded (p.p.m.) were 4.3 in beef liver, 4.2 in beef muscle, 4.5 in raw ham, 4.2 in pork kidney and 4.1 in pork liver. Max. recorded Cd concn. (p.p.m.) were 1.42 in beef kidney, 0.87 in veal kidney and 0.68 in pork kidney. The results are discussed in relation to FAO-WHO recommended monthly intakes; it is calculated that intakes of Pb and Cd in Italy may be resp. 195% and 180% of the FAO-WHO recommended levels. AJDW

## 197

[Studies on some variables in continuous immersion chilling of broilers.] Estudo de algumas variaveis no resfriamento continuo por imersao de frango. [Thesis] Neves Filho, L. de C.

164pp. (1978) [139 ref. Pt, en] Campinas, Brazil; Univ. Estadual de Campinas

A mathematical model of cooling of broilers in a continuous 2-tank screw-conveyor immersion cooling unit was developed; agreement between calculated and experimental values was good. This mathematical method permitted calculation of thermophysical properties of broilers, including the following: density, 1070 kg/m<sup>3</sup>; specific heat 0.80 kcal/kg °C; thermal conductivity 0.42 kcal/m h °C; and coeff. of heat transfer between the carcass surface and water 800 kcal/m<sup>2</sup> h °C. Increasing the quantity of cooling water from 1.6 to 2.1 l/kg chicken had little effect on cooling rate; use of 4 l/kg considerably enhanced cooling rate. The importance of maintaining low temp. in the final chilling stage was confirmed. Bacteriological quality was evaluated during cooling; when properly operated, bacterial counts on the carcass were reduced. Chlorination of the water with ClO<sub>2</sub> was advantageous. Wt. gain was 10.1% with a 5-min subsequent drainage period, 8.5% with a 20 min drainage period. Possible improvements in immersion cooling of broilers are considered. AJDW

## 198

Influence of storage condition and package density on microbiological profiles of ready-to-cook poultry. Prabhakara Reddy, K.; Varadarajulu, P.

*Indian Poultry Gazette* 65 (2) 48-52 (1981) [13 ref. En] [Dep. of Poultry Sci., Coll. of Vet. Sci., Tirupati, Andhra Pradesh, India]

56 broiler halves packaged in polyethylene bags (100, 150, and 200 gauge) were either chilled (5 ± 1°C) or frozen (-10 ± 2°C). Total aerobic count, psychrophilic count, and yeast and mould counts on the carcass surface were estimated on fresh carcasses (0 h), after 48 h and 96 h of chilled storage, and after 15 and 30 days of frozen storage. Birds chilled for 48 h and 96 h, and those frozen for 30 days had significantly higher microbial loads than fresh birds. Total aerobes and psychrophiles were fewer ( $P < 0.05$ ) in birds kept for 15 days under frozen storage than in the fresh birds. There were no significant differences ( $P < 0.05$ ) in the microbial counts on surfaces of carcasses kept in the 3 types of packages. CFTRI

## 199

Performance of broiler chickens subjected to weekly changes in diet composition based on predicted amino acid requirements.

Fisher, M. L.; Leeson, S.; Schaefer, K.; Summers, J. D.

*Canadian Journal of Animal Science* 61 (4) 983-988 (1981) [11 ref. En, fr] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, N1G 2W1, Canada]

Day-old male broiler chicks of a commercial strain were subjected to 2 isocaloric diets based on (i) National Research Council amino acid recommendations [*Nutrient requirements of domestic*

animals. 1. Nutrient requirements of poultry, 7th edition (1977), National Academy of Sciences, Washington, D.C., or (ii) a model calculation (given in tables) worked out for each 7 days of growth based on carcass and feather growth. Diets were formulated on a least-cost basis, and fed on an ad lib. level. At 49 days several birds were exsanguinated, water scalded, defeathered, and carcasses were eviscerated, chilled and graded by Agriculture Canada specifications for % of grade A, B or C carcasses in terms of breast finish, back finish, fleshing and conformation. No significant differences at  $P > 0.05$  for carcass grades were noted between birds from (i) and (ii), and the potential for use of (ii) as a basis for diet formulation is discussed. LH

## 200

[Effect of electro-physical methods of heating on changes in lipids and B group vitamins in chicken meat.]

Takacsova, M.; Surova, E.; Uherova, R.; Smirnov, V. *Hydinarsky Priemysel* 23 (9/10) 355-363 (1981) [Sk] [Chem.-Tech. Fak., Slovenskej Vysokej Skoly Tech., Katedra Chem. a Tech. Sacharidu a Potravin, Bratislava, Czechoslovakia]

Microwave and other modern heat-treatment methods for preparation of semi-prepared chicken, chicken products and ready-to-eat meals are considered, with special reference to maximization of yield, economy of electrical power, and optimum retention of organoleptic properties and nutritional value. The potential for use of these methods for fresh dishes and for products intended for frozen storage at  $-18^{\circ}\text{C}$  for 2-3 months is considered. STI

## 201

The preservation of chicken meat. I. Chemical changes.

Kamar, G. A. R.; Alian, A. M.; Salem, M. A. I.; El-Tantawy, S. M. T.

*Egyptian Journal of Animal Production* 18 (1) 45-56 (1978, publ. 1979) [15 ref. En, ar] [Dep. Anim. Prod., Cairo Univ., Cairo, Egypt]

140 Fayoumi chickens were raised under standard conditions and slaughtered at 16 wk and 0.90-0.95 kg average live wt. Dressing was done under normal commercial conditions and the eviscerated carcasses (0.6-0.7 kg average) were divided into groups. (i) 20 carcasses were placed under a chilling condition using iced water at  $5^{\circ}\text{C}$  for 20 min, or (ii) using iced water + 10 p.p.m. chloramphenicol; carcasses from both groups were packed individually in polyethylene bags and tied firmly for storage in a domestic refrigerator at approx.  $5 \pm 1^{\circ}\text{C}$  for 3, 6, 9, 12 or 15 days. (iii)-(vi) were given freezing treatments, (24 carcasses/group) at  $-10 \pm 1^{\circ}\text{C}$  for 30, 60, 90, 120, 150 or 180 days, i.e. (iii) carcasses were initially put in iced water at  $5^{\circ}\text{C}$  for 20 min; (iv) after being chilled as in (iii) carcasses were packaged individually in polyethylene bags and tied tightly; (v) 10 p.p.m. chloramphenicol was added to the iced water and treatment was as in (iii); (vi) was treated as (v), subsequently carcasses were packaged individually in polyethylene bags and tied tightly. Carcasses (i)-(vi)

were packed in large polyethylene bags according to group, before temp. treatment. 4 fresh carcasses were used as controls. Parameters examined were: rancidity and protein deterioration. Unpackaged carcasses had higher fat %; free fatty acids and peroxide value of skin fat increased gradually during storage, values being lower in chloramphenicol-treated carcasses than in untreated ones; peroxide value was lower in packaged carcasses than in unpackaged ones, whereas packaging increased free fatty acids in the skin; chloramphenicol delayed hydrolytic and oxidative rancidity in skin fat; and packaging delayed oxidative rancidity; amino acid N in breast and leg meat increased on storage, packaged and chloramphenicol-untreated carcasses having higher values. LH

## 202

The preservation of chicken meat. II. Bacteriological changes.

Kamar, G. A. R.; Alian, A. M.; Salem, M. A. I.; El-Tantawy, S. M. T.

*Egyptian Journal of Animal Production* 18 (1) 57-69 (1978, publ. 1979) [14 ref. En, ar] [Dep. Anim. Prod., Cairo Univ., Cairo, Egypt]

Fayoumi chicken carcasses were treated as in part I [see preceding abstr.] and examined for microbial quality. Under refrigeration conditions, the total, psychrophilic and proteolytic bacterial counts in the breast and leg meat decreased during the first half of the storage period in both antibiotic-treated and untreated carcasses, due to the effect of chilling. During the second half of the storage period, the bacterial counts increased gradually in both treated and untreated carcasses as the storage time progressed. The untreated carcasses had more total, psychrophilic and proteolytic bacterial counts in their tissues than the treated ones at any period of storage, therefore, it can be concluded that dipping the carcasses in antibiotics increased their shelflife. Under frozen conditions, the total, psychrophilic and proteolytic bacterial counts were higher in the breast and leg meat of the unpackaged carcasses, whether treated or not, until 90 days of storage. Thereafter higher numbers of bacteria were observed in the packaged carcasses. This could be because wrapping the carcasses in polyethylene bags reduced dehydration, and increased bacterial multiplication. Dipping the carcasses in antibiotics decreased the numbers of bacteria at any period of freezing, whether the carcasses were packaged or not. AS

## 203

[Practicability and trends in poultry inspection (broilers). II. Clinical inspection.] Praktikabilität und Tendenzen in der Schlachtgeflügeluntersuchung (Broiler). II. Zur Schlachtgeflügeluntersuchung aus klinischer Sicht.

Lüders, H.; Siegmann, O.

*Fleischwirtschaft* 62 (5) 591-592; 619 (1982) [De, en] [Klinik für Geflügel, Tierärztliche Hochschule, D-3000 Hannover, Federal Republic of Germany]

The need for clinical inspection of broiler flocks is urged and some practical proposals made for a check list (including constant, variable and current data). [See *Fleischwirtschaft* (1982) 62 (4) 478-479, 493 for part I.]

RM

## 204

**Inactivation and injury of a hemolytic radiation-resistant *Micrococcus* isolated from chicken meat.**

Tan, S.-T.; Maxcy, R. B.

*Journal of Food Science* 47 (4) 1345-1349, 1353 (1982) [En] [Dep. of Food Sci. & Tech., Univ. of Nebraska, Lincoln, Nebraska 68583, USA]

Effects of environmental factors on a highly radiation-resistant haemolytic *Micrococcus* isolated from chicken meat were studied. NaCl tolerance and gamma radiation resistance of the cells were growth phase related. The cells were resistant to injury from drying or freezing/thawing. Under certain conditions, cells in the frozen state required approx. 5 Mrad to inactivate 90% of the population; 0.2 Mrad injured an equivalent proportion. Survival curve of the cells heated at 60°C showed a unique pattern which was in 3 distinct phases. Heat-stressed cells were much more sensitive to radiation inactivation than unheated cells. When suspended in fresh m-Plate Count Broth, the injured cells repaired without multiplication during incubation at 32°C. The repair process in this bacterium, however, was slower compared to thermally injured organisms studied by other workers. IFT

## 205

**Relative evaluation of yield and quality attributes of Nigerian and exotic strains of chicken.**

Okubanjo, A. O.; Babalola, A.

*Journal of Food Science and Technology, India* 18 (6) 243-245 (1981) [19 ref. En] [Meat Sci. Lab., Dep. of Anim. Sci., Univ. of Ibadan, Ibadan, Nigeria]

Prejudice against the consumption of broiler meat in Nigeria is due to its poor palatability and extreme tenderness compared to meat from spent hens. An attempt was therefore made to evaluate the light wt. indigenous chicken strain with 2 dual purpose imported strains (Amocathman and Hyline strains) raised under the same feeding and management regimes. Parameters studied included carcass grade, wt. and % of different parts of the carcass, fleshing and finish, liver colour score, water uptake, objective and subjective data on various traits and acceptability of cooked breast meat. Data on these suggest that intensive feeding and management tend to reduce the toughness and variable organoleptic attributes generally associated with the rearing of the indigenous strain. CFTRI

## 206

**Essential elements in unprocessed and processed frankfurters.**

Marriott, N. G.; Lopez, A.; Williams, H. L.

*Journal of Food Protection* 45 (8) 707-712 (1982) [23 ref. En] [Dep. of Food Sci. & Tech., Virginia Polytech. Inst. & State Univ., Blacksburg, Virginia 24061, USA]

Content of 16 essential elements was determined in 3 kinds of frankfurters by AAS. The element content of frankfurter batter was compared with that of processed frankfurters. There were larger ( $P < 0.05$ ) amounts of Na in beef; Co, Mn and Na in chicken; and Mn, K and Na in meat frankfurters (beef and pork) after Na in meat frankfurters (beef and pork) after

processing. Chicken samples contained less ( $P < 0.05$ ) Cl<sup>-</sup> and K after processing. All frankfurters studied were superior sources of Fe and Zn and fair sources of K when compared to other foods. Element retention ranged from 80.9% to > 100%. Data suggest that processing had minimal effects on element loss. AS

## 207

**Chicken patty line designed for improved nutrition/eating qualities.**

Samples, M.; Andres, C.

*Food Processing* 42 (13) 48-49 (1981) [En] [Jackson Poultry Co., Jackson, Tennessee, USA]

A range of formed chicken products is described, with details of manufacturing processes and formulations. The products are formed from chicken meat, both hand- and mechanically-deboned, with addition of vitamin-fortified vegetable protein and soy protein isolate. JRR

## 208

**A comparison of brined and unbrined paired broiler carcass-halves for tenderness.**

Janki, D. M.; Koburger, J. A.; Oblinger, J. L.

*Poultry Science* 61 (4) 716-718 (1982) [8 ref. En] [Florida Agric. Exp. Sta., Univ. of Florida, Gainesville, Florida 32611, USA]

In each of 2 trials, cooked light and dark meat from bilaterally split, paired carcass-halves were compared for tenderness by shear force analysis after one of the halves had been brined in a 5% (w/w) solution for 16 h prior to cooking. The data indicated that the brining procedure tenderized the meat from the carcass. This procedure had a greater tenderizing effect (on a % basis) on tough muscle than on more tender muscle. AS

## 209

**[Quality of mechanically deboned poultry meat.]**

Nedeljkovic, L.; Isakov, M.; Vojinovic, G.; Sajber, C.; Stankovic, S.

*Tehnologija Mesa* 22 (2) 58-60 (1981) [14 ref. Sh, en] [Jugoslovenski Inst. za Tehnologiju Mesa, Belgrade, Yugoslavia]

Studies were conducted on deboned meat from chickens, hens and turkeys, samples prepared from the breast, back and neck being evaluated. Data are given for fat, protein and Ca concn. Protein content was at least 12%; fat content was < 30%. Ca content was < 0.75%, except in samples from hens. Heat treatment was found to be necessary to prevent spoilage. STI

## 210

**Low poultry prices, consumer demand create a host of new chicken entree introductions.**

Przybyla, A.

*Processed Prepared Food* 151 (3) 118-119 (1982) [En]

New chicken entrees which have recently entered the US prepared food market are described. These include: Swift's International Entree line of Chicken Cordon Bleu, Chicken Kiev, Chicken Lucerne and Chicken

Royale; Banquet's line of Saucy chicken; Empire Kosher Food's Chicken Chow Mein; Tyson's Chick'n with Cheddar (boneless chicken with chunks of Cheddar cheese); Weaver Chicken Roundelets with cheese; Golden Platter Foods chicken outlets and patties; McCarthys State Pride Foods breaded chicken strips; and Mrs Paul's Breaded Chicken Patties 'n Fries. VJG

## 211

[Factors affecting quality of meat of broilers: feeding period, transport, cooling.]

Rustic, M.

*Tehnologija Mesa* 22 (7/8) 227-236 & 236-238 (1981)

[9 ref. Sh & De][Bundesanstalt für Fleischforschung, Inst. für Fleischerzeugung & Vermarktung, 8650 Kulmbach, Federal Republic of Germany]

975 one day old chicks were used for the experiment. The chicks were slaughtered after 5, 6, 7 and 8 months of feeding. Effects of feeding period, transport and cooling on the quality of meat were investigated. Longer feeding periods had favourable effects on slaughter wt. and meat quality. Transport for short distances, up to 20 km, resulted in normal glycolysis, as did transport for 90 km; transport for 45 km resulted in slower glycolysis. Chilling in water and storage at -15°C favourably affected the quality of the meat. STI

## 212

[Dry curing of chicken meat.]

Mroczeck, J.; Gorowska, K.

*Przemysl Spozywczy* 35 (5/6) 190-192, 220 (1981)

[10 ref. Pl][Inst. Tech. Zywosci SGGW-AR, Warsaw, Poland]

The effect of curing compounds on the degree of interaction between pigments and on the level of free nitrite residues in chicken meat was studied, using breast and thigh muscles from both cooled and frozen carcasses, in order to establish optimal conditions. Curing mixture was added at 2.2 kg/100 kg meat and the level of NaNO<sub>2</sub> varied in the range 0.3-1.5 kg/100 kg NaCl, with or without 0.2 kg ascorbic acid/100 kg NaCl. The process was carried out at 4-6°C for 24, 48 and 72 h. Total pigment concn. and that of nitroso pigments in the minced samples were determined by the Hornsey method [*Journal of the Science of Food and Agriculture* (1956) 15, 534]. Residues of free nitrites were estimated using the ISO method. The degree of interaction between pigments was calculated from the ratio of nitroso pigments to total pigments. Selected samples after 48 h curing were heated in boiling water for 20 min in order to estimate the concn. of nitroso pigments and free nitrite residues in the final product. At NaNO<sub>2</sub> levels of 0.0066 to 0.022% (expressed as % meat wt.) and at curing periods up to 72 h, the degree of reaction between pigments was insufficient, and the level of free nitrite residues was high (0.0137% in thigh muscles and 0.0142% in breast muscles). Addition of 0.2% ascorbic acid to the curing mixture increased the speed of nitroso pigment formation and decreased the level of free nitrite residues in cured poultry. Using nitrites in the range 0.022-0.033%, the optimum curing period was 48 h because the degree of interaction between the pigments

was > 50% and only small amounts of free nitrite residues were left in the meat after cooking (<0.01%). Thawed chicken meat cured more quickly than fresh muscles, possibly because of partial destruction of the structure of muscle tissues during freezing, which allows better penetration of the curing mixture. Chicken thigh muscles contained 3 x more haem than breast muscles, but the degree of interaction of haem pigments was higher in the latter. SZ

## 213

*Campylobacter jejuni* survival in chicken meat as a function of temperature.

Blankenship, L. C.; Craven, S. E.

*Applied and Environmental Microbiology* 44 (1) 88-92 (1982) [23 ref. En][Meat Quality Res., Richard B. Russell Agric. Res. Cent., USDA, Athens, Georgia 30613, USA]

Recognition of *Campylobacter fetus* subsp. *jejuni* (referred to hereafter as *C. jejuni*) as an important human pathogen, and its isolation from meat products, indicate the need for knowledge of its survival characteristics in meats. Thermal death times (D-values) for a single strain and a 5-strain composite were determined in 1% peptone and autoclaved ground chicken meat at 49-57°C. Survival was determined for 3 strains in chicken meat at 4°, 23°, 37°, and 43°C. Survival was also determined on raw chicken drumsticks stored at 4°C in either an ambient or a CO<sub>2</sub> atm. D-values were greater in chicken meat than in peptone in all cases. D-values in peptone for strain H-840 at 49°, 51°, 53°, 55°, and 57°C were 15.2, 4.90, 1.71, 0.64, and 0.25 min, resp. The corresponding D-values in ground chicken meat were 20.5, 8.77, 4.85, 2.12, and 0.79 min, resp. Similar results were obtained with a composite of 5 strains. When sterile ground chicken meat was inoculated with approx. 10<sup>6</sup>-10<sup>7</sup> *C. jejuni* cells/g and stored at 37°C in an ambient atm, a 1- to 2-log count increase occurred during the first 4 days, followed by a gradual decline of about 1 log during the remainder of the 17-day storage period. No growth was observed among similarly inoculated samples stored at 4°, 23°, and 43°C, but counts declined by about 1-2 logs at 4°C (17 days), by 2.5-5 logs at 23°C (17 days), and to undetectable levels at 43°C (between 10 and 16 days). Survival on raw chicken drumsticks stored at 4°C in CO<sub>2</sub> and in an ambient atm declined by about 1.5 and 2.0 logs, resp., during 21 days of storage. The effect of temp. on the survival of *C. jejuni* in chicken meat was similar to that reported in other natural and laboratory milieus. Ordinary cooking procedures that destroy salmonellae would be expected to destroy *C. jejuni*. AS

## 214

Food poisoning organisms in frozen foods - effect of freezing and cold storage. III. (Final report).

Hall, L. P.; Slade, P. J.

*Technical Memorandum, Campden Food*

*Preservation Research Association* No. 276, 50pp. (1981) [2 ref. En][Campden Food Preservation Res. Ass., Chipping Campden, Glos., GL55 6LD, UK]

*Salmonella* organisms were inoculated into slurries of beef, chicken and pork, and frozen for storage at -15°C for 168 days. A sampling procedure to examine

survival during this period is detailed. Tables of results are given, including several which compare survival at  $-15^{\circ}\text{C}$  (this study) to survival at  $-25^{\circ}\text{C}$  [part II of the study, FSTA (1982) 14 6B90]. All salmonellae serotypes examined (*Salmonella agona*, *S. typhimurium*, *S. bredeney* and *S. hadar*) were sensitive, in varying degrees, to freezing and cold storage, especially at  $-15^{\circ}\text{C}$ , regardless of substrate. LH

## 215

Pork Farms Poultry puts £2 M into chilled.

Watson, B.

*Chilled Foods* 1 (2) 14-15 (1982) [En]

A description is given of the new 35 000 ft<sup>2</sup> cooked chicken and delicatessen factory of Pork Farms Poultry at Lenton Lane, Nottingham, UK. Until just recently Pork Farms Poultry supplied cooked whole birds and portions. Recently some of the cooked chicken has been used in the formulation of chilled meals e.g. the 7½ oz chicken Waldorf salad. Hot dishes have also been prepared e.g. chicken Chinese style and chicken 'n' leeks. VJG

## 216

Regal foods - center for Swift's frozen entree production.

Mans, J.

*Processed Prepared Food* 151 (3) 51, 58 (1982) [En]

Regal Foods, a wholly-owned subsidiary of Swift & Co. of Skokie, Illinois, has had a \$350 000 addition to the production operation. Included in the new equipment are a stuffed chicken breast production line, freezer and frier. The plant produces about 5½ million lb of product. It receives about 125 000 lb of fresh chicken/wk, packed in ice in 65 lb boxes. Retail products at present produced are Chicken Kiev, Cordon Bleu, Lucerne and Regal. 4 more stuffed breast items will be introduced later: Chicken Luau, Romanoff, Mexical, and Parmigiana. A description is given of the preparation of these products. VJG

## 217

Products including edibles colored with polymeric red colors.

Bunes, L. A. (Dynapol)

*United States Patent* 4 316 918 (1982) [En]

Substituted anthraquinones linked to a polymeric backbone are described. The colorants have various food applications, including: in the manufacture of cherry soft drink, and orange coloured beverage mix which produces an 'orangeade' type beverage on mixing with water, and in a coating mix to give a golden 'simulated deep fried colour' to chicken as it bakes.

RAW

## TURKEYS

1

[HCH residues in soils, plants and animal products in a S. Hessian contamination area.] HCH-Rückstände in Böden, Pflanzen und tierischen Produkten in einem Kontaminationsgebiet Südhessens. [Lecture] Brüne, H.

*Landwirtschaftliche Forschung, Sonderheft* No. 36, 73-83 (1980) [5 ref. De. en, fr] [Hessische

Landwirtschaftliche Versuchsanstalt, Am Versuchsfeld 13, D-3500 Kassel-Harleshausen, Federal Republic of Germany]

The uptake of HCH from contaminated soil into plants and animal products was investigated. Tabulated data showed that roughage and silage were the main sources of HCH residues in milk. Pork samples were within the tolerance limits, but some samples of beef from cold store and 18 beef slaughter animals exceeded the HCH limits. High residue concn. in the body fat of milk cows resulted in high half-life for  $\alpha$ -HCH in milk fat (4.2-22.0 wk, mean 58.2 days). No excess HCH and other chlorinated pesticide residues were found in 50 samples of fruits and vegetables. Examination of spring cereals (wheat, rye, corn, barley, oats) and salad vegetables (lettuce, radishes, parsley) from contaminated fields showed carry-over values (soil to plant) of 0.6 to 1.6, but only very small uptake of HCH into the grain: HCH concn. in the straw were about 500 times those in the grain in the same field. [See FSTA (1982) 14 1A23.] RM

2

Catskill family kosher poultry business moves to national sales with frozen.

Anon.

*Quick Frozen Foods* 42 (10) 56, 58-59, 61 (1980) [En]

A description is given of poultry processing for kosher use at the Falls Poultry Corporation, of South Fallsburg, New York. 20 000-25 000 chickens and turkeys are processed daily at the plant. Freezing and adequate packaging ensure that the kosher product is isolated and therefore can be sold by supermarkets. VJG

3

[Effect of age at slaughter on performance of female turkeys.]

Monetti, P. G.; Parisini, P.; Tocchini, M.; Pitti, A.

*Zootecnica e Nutrizione Animale* 5 (2) 367-379 (1979) [20 ref. It, en] [Istituto di Zootecnia & Nutr. Anim., Univ. di Bologna, 40126 Bologna, Italy]

336 female turkeys were used in a study on effects of slaughter age (14, 16, 18 or 20 wk) on growth and carcass quality. Tables of results are given, including data for wt. and % of various cuts and carcass parts, and correlation coeff. between % or wt. of individual carcass parts. Chilled carcass yield and % breast, carcass skin, thighs, thigh skin and back increased whereas % neck, wings, claws, drumsticks and giblets decreased with increasing age at slaughter. Numerous significant correlations between carcass characteristics were observed. AJDW

4

[Pies and rolled boned meat from poultry.] Pasteten und Rouladen aus Geflügelfleisch. German Democratic Republic, Institut für Fleischwirtschaft der DDR German Democratic Republic Standard TGL 36544, 6pp. (1978) [De]

This standard applies to pies containing boned meat from poultry (chicken, turkey, goose, duck) or to turkey meat as rolled joints. It covers definitions, ingredients, packaging (Al foil), sensory requirements, testing, transport (at 0-20°C), and storage (short-term at 0-6°C away from light). Specific requirements include (max. ranges depending on type): moisture content, 64-70%; fat, 13.5-22%; NaCl, 1.9-2%; and energy content, 750-1100 kJ/100 g. Min protein shall be 13.5-15.5%. KME

5

[Sensory quality testing. Assessment of pies and rolled boned meat from poultry.] Sensorische Qualitätsprüfung. Beurteilung von Pasteten und Rouladen aus Geflügelfleisch.

German Democratic Republic, Institut für Fleischwirtschaft der DDR

German Democratic Republic Standard TGK 36545, 5pp. (1978) [De]

This standard lays down criteria for a scale (0-5) of sensory assessment of pies containing boned meat from poultry (chicken, turkey, goose, duck) or of turkey meat as rolled joints. A table of weighting factors is given. KME

6

Further processed turkey products.

Anon.

*Poultry International* 19 (13) 80-82, 110-111, 113 (1980) [En, de, fr, es, it, ja, ar]

Processed turkey products available in the UK are briefly discussed, with reference to various types of boneless turkey roasts, turkey sausages, and a frozen turkey meat loaf. The growing market for processed turkey products in the USA is briefly considered. AJDW

7

Acceptance and species identification of turkey steaks prepared with beef, pork, lamb, and turkey fat. Brennand, C. P.; Mendenhall, V. T.

*Journal of Food Science* 46 (5) 1624-1625 (1981) [En] [Dep. of Nutr. & Food Sci., UMC 87, Utah State Univ., Logan, Utah 84322, USA]

Fabricated extruded steaks were prepared from turkey meat, salt, phosphate, and water plus 15% beef, pork, lamb, or turkey fat. The grilled samples received relatively high hedonic scores from a sensory panel. The flavour, juiciness, and overall quality of the samples made with pork, beef, and turkey fat were preferred significantly over the samples made with lamb fat. Panel members tended to consider all samples as being pork flavoured. Beef, pork, or turkey fat could be used as the fat in a fabricated, extruded steak without affecting the relative acceptability of the cooked product. IFT

## 8

**Sensory characteristics of postmortem papain injected turkey cooked conventionally or by microwaves.**

Chambers, E. IV; Bowers, J. A.

*Journal of Food Science* 46 (5) 1627-1628 (1981) [En]  
[Dep. of Foods & Nutr., Kansas State Univ., Manhattan, Kansas 66506, USA]

Sensory characteristics of papain-injected turkey breast muscle cooked in microwave or conventional ovens were evaluated by a panel. Off-flavour and mealiness developed in intact turkey muscles injected with papain, but those levels of papain were not sufficient to tenderize the muscle. Samples cooked in conventional ovens had greater roast turkey flavour and were less juicy than samples cooked in microwave ovens. IFT

## 9

**Ultra trace determination of furazolidone in turkey tissues by liquid partitioning and high performance liquid chromatography.**

Winterlin, W.; Hall, G.; Mourer, C.

*Journal of the Association of Official Analytical Chemists* 64 (5) 1055-1059 (1981) [4 ref. En] [Dep. of Environmental Toxicology, Univ. of California, Davis, California 95616, USA]

A simple and sensitive procedure is presented for detn. of furazolidone in turkey tissues, using liquid partitioning followed by HPLC. Fat, liver, kidney, skin, and muscle tissues are ground with methylene chloride in a Polytron homogenizer, followed by solvent removal, partitioning in hexane/0.01M acetic acid, and back-partitioning the 0.01M acetic acid with methylene chloride. HPLC is on a reversed phase Ultrasphere-ODS 5  $\mu$ m column. The method is sensitive to 0.5 ng/g, with a s.d. of 6.39% at the 2 ng/g fortification level. Recovery from fortified tissues averaged 84% from samples fortified with 0.5-10 ng/g furazolidone. An alternative cleanup procedure using a Sep-Pak C<sub>18</sub> cartridge is also presented. AS

## 10

**Early protein nutrition, compensatory growth, and carcass quality of broiler-type tom turkeys.**

Moran, E. T., Jr.

*Poultry Science* 60 (2) 401-406 (1981) [11 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Broiler toms were fed corn-soybean meal rations from 0 to 8 wk of age in 4 treatments providing, resp., excessive, adequate, submarginal and inadequate amounts of protein. All birds received the same feeds from 8 to 14 wk of age. No early treatment effect was detected for chilled carcass wt. and % yield; however, carcass quality was altered. Finishing time was reduced by the highest protein level (fed from 0 to 8 wk), while the lowest protein level decreased fleshing. Dietary protein considered to be optimal for any one production period can be influenced by intake of earlier protein regimens. AS

## 11

**Campylobacter spp. in oven-ready poultry.**

Simmons, N. A.; Gibbs, F. J.

*Journal of Infection* 1 (2) 159-162 (1979) [7 ref. En]  
[Dep. of Clinical Bact. & Virology, Guy's Hospital, London SE1 9RT, UK]

An investigation was carried out to see the extent to which *Campylobacter* spp. present in chickens and turkeys on farms, can survive the process to which the birds are subjected to prepare them for sale as oven-ready poultry. *Campylobacter jejuni* was isolated from the caecal contents of 36 of the 50 birds after evisceration (72%) and from the cavities of the same 36 birds just prior to packaging. It was still present in 24 (48%) after refrigerated delivery to simulated point of sale. In a further investigation, *C. jejuni* was isolated from 20 of the 25 air-chilled chickens (80%), 8 of the 10 water-chilled chickens (80%), 5 of the 6 air chilled turkeys (83%) and all 6 water-chilled turkeys (100%). After swabs had been taken the birds were deep frozen at -20°C and after 3 wk 14 of the frozen chickens from which campylobacters had been isolated were re-examined. *C. jejuni* was recovered from 6 of the 14 (43%) chickens. VJG

## 12

**Cooking characteristics, yields and tissue composition of Small White turkeys as affected by back finish grade, sex and strain.**

Moran, E. T., Jr.

*Canadian Institute of Food Science and Technology Journal* 14 (3) 209-213 (1981) [7 ref. En, fr] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario N1G 2W1, Canada]

Diamond White and Wrolstad Small White turkeys were reared sexes-separate on common feed to 14 wk of age. Chilled carcasses were selected to have either an A- or B+ back finish grade, but all to exhibit A- for breast finish and be of equivalent conformation and fleshing. Wt. approximated the respective sex and strain average. % total cooking loss was comparable between treatments. Females and A- finished carcasses had proportionally more drip fat than males and B+, resp. Relative amount of wings on the cooked carcasses was less with an A- than B+ finish, but more from males than females. % meat on the breast was greater with B+ than A- carcasses while skin acted to the converse. Females had more meat on the breast and skin on the thigh than males while bone in both parts decreased. Compositional changes for the breast were a greater fat and reduced N content of skin with females as compared to males. Skin and meat for the thigh from A- carcasses had less moisture and more fat than B+. Both strains acted comparably. Overall effects due to sex were more extensive than could be attributed to finish grade. Impact on quality for the consumer by removing back finish from the grading scheme, but leaving breast finish, was considered nil. AS

13

**Effect of end-point cooking temperature upon nutritive value and composition of turkey meat.**  
Sheldon, B. W.; Essary, E. O.; Bovard, K. P.; Young, R. W.

*Poultry Science* 59 (12) 2725-2732 (1980) [24 ref. En]  
[Dep. of Food Sci., N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

Broad Breasted White turkeys (two 7.26 kg females/treatment) were roasted in an electric household oven preheated to 177°C (350°F) to end-point temp. of 74°C (165°F), 79°C (175°F), 85°C (185°F), and 91°C (195°F). Breast and thigh meat (without skin and visible fat) for each end-point temp. was pooled, freeze-dried, and fed at a 20% level in diets to International Cancer Research (ICR) white mice. A casein-type diet was fed as the control. All diets contained 19% protein, 10% fat, and 4.17 kcal/g of digestible energy. Fifty 18-day-old male mice were fed for 5 wk and 50 females for 2 wk. Turkey meat roasted to different end-point temp. produced significantly ( $P \leq 0.01$ ) different wt. of mice. Average wt. of males and females were greatest for those fed turkey meat roasted to 79°C and 85°C, resp. Growth rates were greater for mice fed diets containing turkey meat than for those fed the control diet. Results of this study showed a quadratic effect of end-point roasting temp. on growth. Amino acid levels were highest in turkey meat roasted to an end-point temp. of 79°C. AS

14

**Partial dewatering of mechanically deboned poultry meat.**

Maurer, A. J.; Goble, J. W.

*Poultry Science* 60 (4) 750-760 (1981) [38 ref. En][Dep. of Poultry Sci., Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Mechanically deboned turkey meat and chicken were subjected to partial dewatering during thawing. Treatments included draining, draining under pressure, centrifugation, and partial dehydration. Exudates were measured for moisture and protein content, and partially dewatered meat was analysed for proximate composition and for emulsifying and water holding capacities. Frankfurters made from the dewatered meat were subjected to objective and subjective analyses. The treatments of removing exudate from mechanically deboned poultry meat under pressure and of centrifugation generally yielded the greatest moisture reduction and improvement in emulsifying capacity. Dehydration techniques did not appear practical, and pressure treatments with press devices were not satisfactory. Frankfurters made from partially dewatered meat were generally no better than those from control meat formulations. Therefore, partial dewatering of mechanically deboned poultry meat may not be justified. AS

15

**The effects of electrolyte feeding, pre-slaughter temperature stress, and post-slaughter processing conditions on the quality characteristics of turkey breast muscles.**

Babji, A. S.

*Dissertation Abstracts International, B* 41 (12) 4315:  
Order no. 8111674, 123pp. (1981) [En][Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

Hen turkeys were exposed to pre-slaughter electrolyte treatment (0.05, 0.10 and 0.15% at 21 wk) for 3 days prior to slaughter and no effect on meat quality was observed, but levels up to 1% improved % water uptake. Pre-slaughter temp. stress (38°C for 4 h) of tom turkeys gave breast muscles of slightly lower pH, water holding capacity, cooking yield, and a higher shear value. Meat colour was pale in heat stressed birds, so cool pre-slaughter holding is recommended. Post-slaughter tumbling of whole turkey carcasses at 20 rev/min for 30 min at 7°C, resulted in improved cooking yield and lower shear values. Thus a level of electrolyte could wisely be applied, especially in heat stressed birds, to reduce wt. loss and shrinkage, and tumbling is an added protection. LH

16

**Hemagglutination and adhesive properties of *Escherichia coli* isolated from diseased turkeys.**

Fardiaz, S.

*Dissertation Abstracts International, B* 41 (12) 4440-4441: Order no. 8112079, 118pp. (1981) [En][Michigan State Univ., E. Lansing, Michigan 48824, USA]

Strains of *E. coli* isolated from diseased turkeys were of 3 serotypes, i.e. 0:1:K1, 0:2:K1 and 078:K80. Haemagglutination activities and adhesive properties of the isolates were tested with respect to turkey small intestinal tissue, and effect of temp. and incubation was examined. D-mannose and  $\alpha$ -methyl-D-mannoside at 0.4 and 0.5%, resp. reduced bacterial numbers by 1 log cycle. Adhesion was completely inhibited by

concanavalin A and sodium metaperiodate at 0.2 and 0.1%, resp.; and substantially inhibited by isolated pili at 2.0 mg protein/ml (approx. mol. wt. of protein was 34 800). LH

17

**Effect of further processing systems on selected microbiological attributes of turkey meat products.**

Denton, J. H.; Gardner, F. A.

*Journal of Food Science* 47 (1) 214-217 (1982) [En]  
[Poultry Sci. Dep., Texas A&M Univ., College Station, Texas 77843, USA]

Effects of carcass transfer and line transport, deboning, protein extraction and product wrapping, meat blending, product packaging and cooking-smoking procedures on microbiological concn. were evaluated. Increased mesophilic bacterial numbers were associated with carcass transfer and line transport with no effects on other bacterial concn. Hand deboning increased bacteria on breast and thigh tissue.

**Mechanical deboning increased bacterial content.**  
Protein extraction and product wrapping produced minor effects. Bacterial numbers from meat blends reflected combination of input components. Product packaging exerted minor effects on numbers of bacteria from raw product. Handling required in packaging cooked product produced increases in tissue bacterial content. Cooking and smoking procedures were equally effective in reducing bacterial contents to essentially negative concn. IFT

## 18

### Effects of sex, age, preslaughter factors and holding conditions on the quality characteristics and chemical composition of turkey breast muscles.

Ngoka, D. A.

*Dissertation Abstracts International, B 42 (3) 841:*

Order no. 8118176, 143pp. (1981) [En] [Univ. of Nebraska, Lincoln, Nebraska 68503, USA]

160 16- and 20-wk old hen and tom turkeys were randomly selected, further randomized into 5 groups and exposed to various preslaughter factors and holding conditions, namely, excitation followed by a resting or non-resting period and ad lib. feeding or 15 h feed withdrawal, prior to anaesthetization with sodium pentobarbital and slaughter. Anaesthesia completely eliminated struggle at slaughter and, when compared to the free struggle (control) group, caused significant differences in initial pH, tissue glycogen content, water holding capacity (WHC), shear force, yield and colour values; anaesthesia had no effect on chemical composition, final pH, cooking loss, thaw loss and live wt. Feed withdrawal had a significant effect on final pH, WHC, live wt. and moisture content. Excitation produced significant changes in WHC, shear, yield, live wt. and colour. Age had a significant effect on tissue glycogen, shear, yield, thaw loss, live wt., colour and fat content. Sex had a significant effect on live wt. and ash content. The interactions between sex, age, preslaughter factors and holding conditions were also examined. JA

## 19

### Contribution of sage and bread stuffing to roast turkey flavor.

Martinez, J. B.

*Dissertation Abstracts International, B 41 (12) 4442:*

Order no. 8106516, 247pp. (1981) [En] [Univ. of Wisconsin, Madison, Wisconsin 53706, USA]

Influence of sage-based stuffing and seasoning on chemical and sensory properties of roast broad-white turkeys (*Meleagris gallopavo*) was studied. Volatile components of roast turkeys rubbed with Dalmatian sage (DS) (*Salvia officinalis*) and wild sage brush (SB) (*Artemisia tridentata*) were isolated and analysed by gas chromatography and fast-scan MS. Over 80 compounds were identified from DS and 80 from SB, and > 100 in volatiles from turkeys roasted in DS. Predominant compounds in DS included thujone, camphene,

camphor, limonene, caryophylline and thujene, and the most abundant odours were transferred to turkeys by the highest amount, penetration depending on volatility and polarity of compounds, and skin and bone barriers. Sensory evaluation supported chemical data. Breast and thigh meat from highly seasoned, unstuffed turkeys received higher scores for intensity of seasoning

flavour, juiciness, and overall desirability than that from moderately seasoned, stuffed turkeys, perhaps due to slightly more moisture in the former. Stuffing cooked inside turkeys was more acceptable than that cooked in Al foil. Heat penetration data and time-temp. roasting curves were established for stuffed and unstuffed birds.

LH

## 20

### Dependence of meat quality on storage temperature and storage time of turkeys.

Ristic, M.

*Fleischwirtschaft* 60 (10) 1883 & 1894-1895 (1980)

[3 ref. En & De] [Bundesanstalt für Fleischforschung, 8650 Kulmbach, Federal Republic of Germany]

347 turkey carcasses were frozen, and stored at -10°, -15°, -20° and -30°C for up to 24 months.

10 carcasses were thawed at monthly (-10°C) or 3-monthly (-20°C) intervals, cut and examined for physical (pH, colour) and sensory parameters and for fat quality (peroxide and aldehyde numbers). Results from storage at -10° and -20°C are reported (180 carcasses). Applying the definition of storage ability [see Ristic et al; FSTA (1977) 9 2S292] quality grades are distinguished: excellent quality (short storage), good quality (medium storage), satisfactory quality (long storage). The following storage times are recommended for the 3 grades, assuming high quality carcasses, constant temp. and adequate packaging: -10°C, 4, 6 and 9 months; -20°C, 14, 18 and 21 months.

RM

## 21

### Gelation property of salt soluble protein of turkey muscle as related to pH.

Angel, S.; Weinberg, Z. G.

*Journal of Food Technology* 16 (5) 549-552 (1981)

[8 ref. En] [Div. Food Tech., Volcani Cent., PO Box 6, Bet Dagan, Israel]

The gelation property of the salt-soluble proteins of turkey breast and thigh plus drumstick were compared, and the proteins of the latter were found to have greater gelation capacity. The experiments were repeated on 3 separate occasions during which the pH level of the breast muscle was found to range from 5.8 to 5.95, while that of the leg meat ranged from 6.0 to 6.8. It is concluded that the different gelation capacities, which are apparently related to the initial pH level in the breast and leg meats, could affect palatability and should be taken into account in the development of turkey products. AS

## 22

Producing small turkeys in 1969 and 1979: performance, carcass quality, and yields of commercial strains.

Moran, E. T., Jr.

*Poultry Science* 60 (4) 713-722 (1981) [6 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Diamond White and Wrolstad Small White turkey eggs were incubated together, and pouls were reared in the same facility during 1969 and 1979. Feeding and management paralleled existing commercial circumstances for each yr. Although processing was done at different plants, grading and carcass yields were performed by the same people. No change in finish was apparent; however, fleshing and conformation grades decreased. A greater proportion of breast and thigh from the chilled carcass, at the expense of wings and drumsticks, appeared in 1979 as compared to 1969. Diamond White gave a better total production carcass quality in 1969, but the converse was true for 1979. Overall results suggest that an advanced degree of maturity relative to age occurred. AS

## 23

[How can we kill *Salmonella*?]

Eklund, T.

*NINF Informasjon* No. 5, 45-54 (1980) [No]

The use of preservatives and antioxidants to eliminate the danger of salmonellae in foods is discussed. In tests on turkey carcasses carried out at the author's Institute, propyl paraben and butylated hydroxyanisole (BHA) gave good results as dips against *S. typhimurium*, although BHA gave a definite off-odour. Use of propyl paraben is particularly recommended. HBr

## 24

Talking turkey.

Nixey, C.

*Feed Compounder* 2 (2) 18-22 (1982) [En]

This paper on effects of diet variables and slaughter wt. on growth rate and performance of turkeys includes data for the % yields of breast meat, thigh meat, 'drum' meat, wing meat, total meat and total skin for turkeys on good and poor feed programmes, and for the extent of loss of these carcass components as a result of use of a poor feed programme. AJDW

## 25

Aroma, color, and lipid oxidation of turkey muscle emulsions.

Tellefson, C. S.; Bowers, J. A.; Marshall, C.;

Dayton, A. D.

*Journal of Food Science* 47 (2) 393-396 (1982) [En] [Dep. of Food & Nutr., Kansas State Univ., Justin Hall, Manhattan, Kansas 66506, USA]

Turkey emulsions were prepared with no additives, NaCl, NaNO<sub>2</sub>, sodium ascorbate (NaAsc), or both NaNO<sub>2</sub> and NaAsc. Raw and cooked emulsions from

each of the treatments were stored (-18°C) and then evaluated before and after heating. Emulsions with NaNO<sub>2</sub> and NaAsc contained less malonaldehyde than those with NaCl or no additive, and raw turkey emulsions generally contained less malonaldehyde than cooked. Nitrite was the additive that produced the major effect on colour of heated emulsions. Generally, emulsions containing both NaNO<sub>2</sub> and NaAsc had the most meaty aroma and the least stale aroma. Emulsions with NaCl tended to have greater stale aroma. IFT

## 26

Observations on the glutamic-oxaloacetic transaminases of turkey breast muscle during chill storage.

Jones, J. M.; Rooney, C. C.

*Journal of Food Technology* 17 (1) 135-138 (1982) [11 ref. En] [ARC Food Res. Inst., Colney Lane, Norwich, NR4 7UA, UK]

Presence of the mitochondrial isoenzyme of glutamic-oxaloacetic transaminase (GOT<sub>m</sub>; = aspartate aminotransferase EC 2.6.1.1) in press juice from meat has been suggested as means of differentiating frozen and thawed meat from fresh (chilled) meat, in the press juice of which sarcoplasmic GOT (GOT<sub>s</sub>) should be responsible for the GOT activity. Applicability of this test on stored chilled turkey breast muscle was studied. Samples of turkey breast muscle were stored in O<sub>2</sub>-permeable polyethylene film or in vacuum-packs (Cryovac 'Barrier Bags') at 1°C for 0-24 days, and GOT isoenzymes in press juice were studied electrophoretically. Although GOT<sub>m</sub> never appeared in press juice from muscles stored in vacuum packs, it did appear in that from muscle stored in O<sub>2</sub>-permeable packs after as little as 4 days at 1°C, showing that its presence was not diagnostic of freezing and thawing. DIH

## 27

Carcass finish and breast internal oil basting effects on oven and microwave prepared small toms: cooking characteristics, yields and compositional changes.

Moran, E. T., Jr.; Larmond, E.

*Poultry Science* 60 (6) 1229-1244 (1981) [21 ref. En] [Dep. of Anim. & Poultry Sci., Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Chilled carcasses from a 12-wk-old flock of Small White toms [male turkeys] were selected to have either an A or B finish but to be equivalent in wt., conformation, and fleshing. One-half of each grade was internally basted in the breast with coconut oil. All treatments were examined raw and after conventional oven and microwave preparation. Basting reduced oven preparation time. Total loss was less by microwave than oven and with high finish as compared to low. Edible yield in terms of commercial parts and meat-skin-bone was greater in B than A carcasses. Moisture of the breast meat was unaffected by grade and basting but decreased with cooking to a greater extent with oven than microwave preparation. More ether extract was found in the raw breast muscle of A than B carcasses.

and with basting than if not. Oven cooking tended to increase and microwave decrease ether extract of controls relative to raw state. Basting oil was largely lost in the drip upon cooking. Oil retention appeared better with A than B carcasses when oven cooked but the converse occurred by microwave. Overall results question finish as a carcass quality criterion for the consumer, particularly if basted and/or microwave prepared. AS

## 28

### The effects of trenbolone acetate on carcass composition, conformation and skeletal growth of turkeys.

Ranaweera, K. N. P.; Wise, D. R.

*British Poultry Science* 22 (2) 105-114 (1981) [11 ref. En] [Dep. of Clinical Vet. Med., Univ. of Cambridge, Madingley Road, Cambridge CB3 OES, UK]

Carcasses of 6 male turkeys aged 66 and 73 days, implanted with 20 mg trenbolone acetate at 49 days of age, were analysed for growth, carcass composition and effects of the treatment on skeletal conformation. Treated birds tended to be heavier ( $P > 0.05$ ) while carrying significantly less feather wt. ( $P < 0.05$ ). The treatment increased carcass moisture content, but effects on fat, ash, N, K and Na content were not significant. JRR

## 29

### Influence of packaging on the shelf-life and spoilage of chill-stored turkey portions. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Mead, G. C.; Jones, J. M.; Griffiths, N. M.

pp. 447-453 (1981) [10 ref. En] [Agric. Res. Council Food Res. Inst., Norwich, Norfolk, UK]

Microbiological, chemical and sensory changes were determined for turkey breast fillets and drumsticks in either O<sub>2</sub>-permeable film or vacuum packs during storage at 1°C. The use of vacuum packs delayed 'off' odour development from 16 to 25 days in the case of breast fillets and from 14 to 20 days for drumsticks, but in each case the 'off' odours were preceded by marked changes in the flavour of some samples. At spoilage, pseudomonads predominated on both types of portion in O<sub>2</sub>-permeable packs, whilst in vacuum packs the predominant organisms comprised 2 groups of bacteria resembling 'atypical lactobacilli', one being more common on breast fillets, the other on drumsticks. Protein breakdown, as measured in 'tyrosine units', was observed in all cases during storage, but occurred most rapidly in vacuum-packed breast fillets. Levels of hypoxanthine, previously associated with flavour changes in meats, had increased at least 4 x by the time packs were considered spoiled. AS

## 30

### Dependence of food value of turkey meat on turkeys' age. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Shumkov, E. G.; Davydova, N. P.; Bulgakova, L. V.

Daulbayeva, R. A.; Khlevovaya, V. V.

pp. 351-355 (1981) [11 ref. En] [Sci. & Production

Amalgamation "Complex", USSR]

105 White Broadbreasted turkeys were used in a study on effects of age at slaughter (90, 120 or 150 days) on characteristics of meat; the *pectoralis major* muscle was studied. Tables of data are given, including values for moisture, protein, fat, tryptophan and hydroxyproline content, muscle fibre diam., nucleus diam., muscle pH, losses during heat treatment, juice release on squeezing, elastic and plastic properties, and biological value. Protein and hydroxyproline content increased and moisture and fat contents decreased with increasing age. Birds slaughtered at 90 days of age had larger nucleus diam. than the older birds; muscle fibre diam. increased with increasing age. Juice release was highest at 120 days of age; heat treatment losses were lowest and pH highest at 150 days of age. Meat from 120-day-old turkeys had the highest biological value. AJDW

## 31

### Fleshing and meat qualities in caged turkeys. (In 'Quality of poultry meat' [see FSTA (1982) 14 11S2052]) [Lecture]

Fisinin, V. I.; Stollyar, T. A.; Alexeyev, F. F.

pp. 345-350 (1981) [5 ref. En] [All-Union Poultry Res. & Tech. Inst., 141300 Zagorsk, Moscow Region, USSR]

Comparative studies were conducted on White Broadbreasted turkeys reared either (i) on litter or (ii) in cages, up to 13 or 16 wk of age. Data are presented for carcass yield; % yield of edible parts, total muscle, breast muscle, skin and bone; DM, protein and fat contents of breast and leg muscles; % content of protein fractions in breast and leg muscle; and tryptophan and hydroxyproline contents and tryptophan/hydroxyproline ratio of the breast and leg muscles. The results show that (ii) had higher carcass yield, yields of edible parts, total muscle and breast muscle, higher % skin + subcutaneous fat, lower % bones, higher % DM, protein and fat in the muscle than (i). Little difference between (i) and (ii) was observed for protein fractions, tryptophan and hydroxyproline contents of the muscles. Organoleptic properties of meat from (ii) were better than those of meat from (i). AJDW

## 32

### Evaluation of various methods for roasting frozen turkeys.

Cornforth, D. P.; Brennan, C. P.; Brown, R. J.; Godfrey, D.

*Journal of Food Science* 47 (4) 1108-1112 (1982) [En] [Dep. of Nutr. & Food Sci., Utah State Univ., Logan, Utah 84322, USA]

Frozen turkeys were roasted to a lower than normal final temp. (71.1°C) by one of the following methods: foil tent, 93.3°C oven; foil wrap, 93.3°C oven; foil tent, 162.8°C oven; roasting bag, 176.7°C oven; foil wrap, 204.4°C oven; or microwave oven. Birds roasted by low temp. methods received highest ratings for most attributes. Basted birds were preferred for all eating quality attributes. Microwave roasted birds reached final temp. fastest and with least energy consumption, but were rated low in appearance and eating qualities, and often had undesirably pink thigh joints. Turkeys inoculated with *Salmonella typhimurium* and *Clostridium perfringens* vegetative cells were essentially sterilized by all roasting methods. These methods can be considered as convenient alternatives to conventional roasting procedures. JET

## 33

**Avoparcin as a growth promotant for turkey broilers.**

Hulan, H. W.; Proudfoot, F. G.

*Canadian Journal of Animal Science* 61 (4) 1067-1069

(1981) [9 ref. En] [Res. Cent. Agric. Canada, Kentville, Nova Scotia B4N 1J5, Canada]

Day-old turkey poult (total 2400) were fed (i) grower/finisher diets without avoparcin, or (ii) diets + 10 p.p.m. avoparcin, up to 98 days. % grade A carcasses were larger for female poult, and for females increased in treatment (ii), i.e. male (i) and (ii) 58.9 and 57.4, vs. 69.5 and 72.0 in corresponding females; differences were not significant. LH

levels of residual  $\text{NO}_2^-$  and salt received higher, but not significantly different, taste panel scores for cured meat flavour intensity, salt intensity, and juiciness. These results show that cured meat flavour and colour can be produced in turkey breast tissue with 25% of the max. permitted levels of  $\text{NaNO}_2$ . The results

also suggest that curing time can be reduced if more uniform colour can be obtained with direct injection of brine followed by immediate cooking and smoking. AS

## 34

**Performance and carcass grade characteristics of turkeys fed the growth promoter, avoparcin.**

Leeson, S.; Summers, J. D.

*Canadian Journal of Animal Science* 61 (4) 977-981

(1981) [4 ref. En, fr] [Dep. of Anim. &amp; Poultry Sci., Univ. of Guelph, Guelph, Ontario, N1G 2W1 Canada]

2 trials were conducted, in the second of which a 'broiler turkey' (BD) feeding regime (described in a table) was used for female turkey poult. 3 diet treatments were tested, i.e. (i) a control of BD + 33 p.p.m. robenz (a coccidiostat), (ii) BD + 10 p.p.m. avoparcin, (iii) BD + 10 p.p.m. avoparcin + 33 p.p.m. robenz, using 4 replicate groups of 20 poult/treatment. At 88 days birds were weighed, exsanguinated, and processed according to commercial practice. Chilled carcasses were graded according to Agriculture Canada specifications. Dressing % in (i)-(iii) was 80.2, 81.2 and 80.4; % grade A carcasses in terms of breast finish, back finish, fleshing and conformation are also tabulated. It is concluded that avoparcin has significant potential as a growth promoter in turkey diets. LH

## 35

**A comparison of curing practices and sodium nitrite levels on the chemical and sensory properties of smoked turkey.**

Sheldon, B. W.; Ball, H. R.; Kimsey, H. R., Jr.

*Poultry Science* 61 (4) 710-715 (1982) [13 ref. En]

[Food Sci. Dep., N. Carolina State Univ., Raleigh, N. Carolina 27650, USA]

3 different curing procedures using 2 levels of  $\text{NaNO}_2$  were evaluated for colour, residual  $\text{NO}_2^-$ , %  $\text{NaCl}$ , % moisture, and organoleptic quality of smoked turkey. Curing procedures included (i) soaking in a 15%  $\text{NaCl}$  brine for 48 h prior to cooking, (ii) injecting an amount of 15% salt brine equal to 10% of the carcass wt. followed by soaking in 15% brine for 24 h, and (iii) injecting brines to obtain a finished product with 2% salt and cooking immediately. Turkeys were smoked while cooking to an internal temp. of 71°C. Smoked breast meat from turkeys cured with reduced amounts of  $\text{NO}_2^-$  had significantly lower residual  $\text{NO}_2^-$ . (iii) yielded breast meat with the highest concn. of residual  $\text{NO}_2^-$  and salt. Hunter colour "a" values demonstrated no cured colour difference in breast tissues due to concn. of  $\text{NO}_2^-$  in curing brine, whereas significant colour differences resulted from cure methods. Injection with immediate cooking resulted in less uniform colour development. Product with higher

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16. Taints in Food	□ £11.00	□ £6.50	□ £11.00	
17. Microbial Toxins in Food	□ £13.00	□ £8.00	□ £13.00	
18. Smoked Food Products	□ £11.00	□ £6.00	□ £10.00	
19. Disposal of Waste Food Products	□ £15.50	□ £8.50	□ £14.00	
20. Use of Glucose in Food Products	□ £10.50	□ £5.50	□ £10.00	
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28. Content and Analysis of Lead in Foods	□ £11.00	□ £6.00	□ £10.00	
29. Heatable Packs	□ £10.50	□ £5.50	□ £9.50	
30. Sulphur Dioxide in Food Products	□ £11.00	□ £6.00	□ £10.00	
31. Lactic Acid Bacteria in Beverages and Food	□ £13.00	□ £8.00	□ £13.00	
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33. Browning of Foods	□ £11.00	□ £6.00	□ £10.00	
34. Aflatoxins	□ £11.50	□ £7.00	□ £11.00	
35. Antibiotic Properties and Residues in Food excluding Nisin	□ £10.00	□ £5.50	□ £9.50	
36. Nisin	□ £10.00	□ £5.50	□ £9.50	
37. Cadmium in Foods	□ £10.50	□ £6.00	□ £10.00	
38. Coffee	□ £11.00	□ £6.50	□ £11.00	
39. Sorbic Acid	□ £11.00	□ £6.00	□ £10.00	
40. Arsenic in Foods	□ £10.00	□ £6.00	□ £10.00	
41. Ascorbic Acid	□ £10.00	□ £6.00	□ £10.00	
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50. Mycotoxins in Foods (Excluding Aflatoxins and Microbial Toxins)	▪ □ £16.00	□ £9.00	□ £14.50	
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	▪ □ £11.00	□ £6.00	□ £11.00	

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